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ARCHITECTURE

By W. R. LETHABY

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ARCHITECTURE
AN INTRODUCTION
TO THE HISTORY
AND THEORY OF THE
ART OF BUILDING

BY W. R. LETHABY

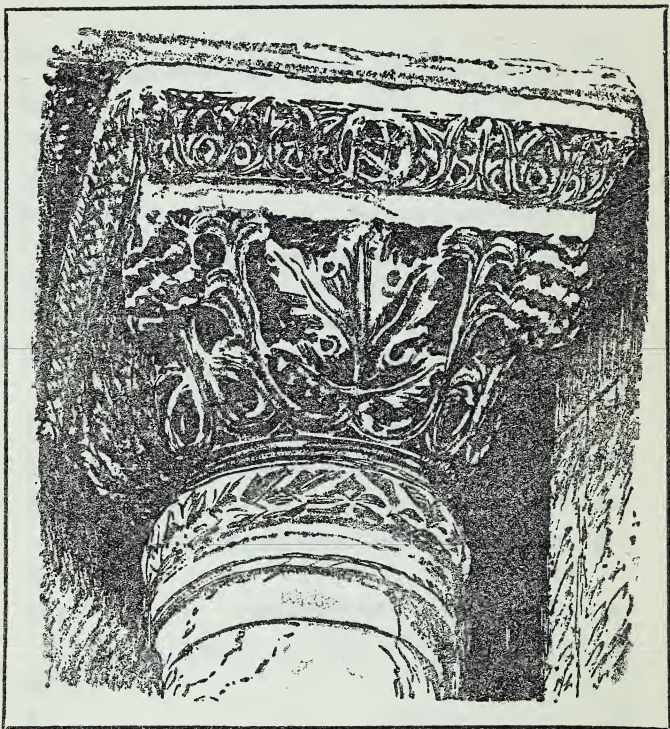
“Man makes beauty of that which
he loves.”—RENAN.

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BYZANTINE CAPITAL

This capital is a work of the sixth century, and bears the monogram of the Emperor Justinian on the abacus. In the eleventh century it was brought to Venice and re-used in the church of St. Mark.

ARCHITECTURE

CHAPTER I

ARCHÆOLOGY, ARCHITECTURE, AND ORNAMENT

Two arts have changed the surface of the world, Agriculture and Architecture. Perhaps the scale of architectural activity is not generally realized. The art of building is concerned not only with single structures but with cities, and hence with whole countries, for Egypt, Greece, and Italy were groups of cities rather than geographical spaces empty of men and dwellings. Architecture is the matrix of civilization. In this small volume I wish, while outlining the larger facts of the history of architecture, especially to bring out its origins and to call attention to the great contributions which from time to time have been made to its powers by divers schools. A history of architecture might be written according to several schemes; it might be a chronology and description of individual works—a collection of biographies of build-

ings; it might treat of the rise, fall and interaction of different schools; or it could trace out when and how each new thing of value was brought into architecture, considered as a whole. In an exhaustive history the great facts may be hidden by the detail, so that one may not see the city for the houses. A small book, which does not permit of dealing with individual buildings, might better suggest the onrush of perpetually changing art which, while we try to grasp it, has already put on another form. Although it may be convenient to study the art historically, it must be remembered that archæology is not architecture, any more than the history of painting is art; archæology is history, architecture is the practical art of building, not only in the past, but now and in the future. Yet even in a history the general scope and powers of architecture might be suggested.

On the other hand, the wall, the pier, the arch, the vault, are elements which should be investigated like the lever and the screw. Modern builders need a classification of architectural factors irrespective of time and country, a classification by essential variation. Some day we shall get a morphology of the art by some architectural Linnæus or Darwin, who will start from the simple cell and relate to it the most complex structures. In architecture more than anywhere we are the slaves

of names and categories, and so long as the whole field of past architectural experiment is presented to us accidentally only under historical schedules, designing architecture is likely to be conceived as scholarship rather than as the adaptation of its accumulated powers to immediate needs—the disposition of its elements, walls, piers and arches, for maximum efficiency relative to a given purpose. The lack of such a true classification is in part the reason why modern architects swing from playing at Greek to playing at Gothic, and then back again to Greek, with pathetically ineffectual enthusiasm.

Even in an historical narrative it may be possible to bring out principles and ideas rather than to describe examples, and the writer would, above all, like to suggest a general theory of architecture as a result of the survey of the past. To anticipate, it may be said here that great art is not a question of shapes and appearances which may be copied, it is fine response to noble requirement; a living architecture is always being hurled forward from change to change.

* * * * *

In the introduction to the great *History of Art in Antiquity* by Perrot and Chipiez we are told that “no satisfactory definition has ever been given of the word architecture, and yet when we use it every one knows what we

mean." That is rather a dangerous assumption. The difficulty of defining the word comes from the feeling that architecture is a high and poetic word, while the mass of building in our cities is not highly poetic. Therefore there is a tendency to think that architecture is only decorated or romantic building. But what is a decorated building? A gin-palace at the next corner drips with much decoration, while the pyramids had none. What is a noble and romantic building? Is not an old cottage of cob and thatch, which seems to have risen self-built out of the ground, nobler and infinitely more touching than the last new and expensive villa is likely to be? Some inquirers, not satisfied with such a test as size and ornament—that is, of cost—say that architecture should have an expression over and above the mere essentials of building. But here, again, a difficulty arises—What is *mere* building? Every building carries some sort of expression, some essential appeal to the imagination. The first definition of architecture which satisfied me for a time—it was struck off in conversation with a friend—was that architecture was building touched with emotion. But what is usually understood by such claims is that some expressional content should be *consciously* embodied in a building. Yet we cannot think that old works of architecture thus had their

expression given to them arbitrarily. The cottage, the bridge, the castle,—were they intended to look pathetic, bold, romantic,—or is the due expression inherent in the thing itself, so far as it is right and true? It would be difficult to prove that the most superb castle was designed to look romantic, it was designed to be strong. The plough, the hayrick, the ship, are all highly poetic, but their makers do not think of poetry. The more real such a thing is, the closer to need and nature, the more romantic it will be also. A self-conscious æsthetic “appeal” is likely to become a disease of art, the true appeal is a fact. Barns, wagons and lighthouses do not appeal, they *are*, or I should say, *were*, for I saw a lighthouse some months since on which no expense had been spared to make it æsthetic, and it illuminated the whole problem.

We cannot reach any satisfactory definition of architecture on the principle that architecture is good building, and building itself is bad building—it embodies an absurdity.

On the other side it is said, “Much building is mean and poor, is *that* architecture?” Not that, either. Every art must be judged on its positive side, by its strength, not by its weakness and defects. Yet to be real is not all; there is evidently a scale of realities.

All architecture is not great architecture. The other day I passed a large group of well-built factory chimneys—tall, daring structures that were real enough, and exemplified to perfection the principle of balance. I should have known them as beautiful if they had been minarets in Persia, but here, it must be confessed, they did not fill my mind with unmixed joy; the malign effect of their smoke on the landscape was evidently a serious set-off against their unaffected reality. The mind unconsciously pierces far beyond mere shape to the soul of a building.

We possess in Ruskin's *Seven Lamps of Architecture* a most stimulating treatise on modes of beauty in architecture, but with all its power and insight it is only a fragment. It is not concerned with building, the art of making chambered structures, the rearing of walls and balancing of vaults, but with the added interests of painted and sculptured stories. It is a treatise on the temper and conditions from which noble architectural ornamentation will spring. At the back of it was an idea only clearly stated in a little note added to a later edition of the work—"The founding of all beautiful design on natural form was the principle I had during the arrangement of this volume most prominently in mind . . . there is too much stress laid throughout this volume on probity in pictur-

esque treatment, and not enough on probity in material construction." His concern being with the decorative matter in architecture, he identified this matter with architecture itself. If, he says in effect, we isolate architecture from mere building, however noble the mere building may be, it is only sculpture with other forms of story and decoration. This, of course, is true, and if we are to approach architecture as a whole it is plain it must not be so isolated from the most of its very self.

It is impossible to differentiate architecture from building, and probably we shall not find any need for so doing if we realize how truly interesting are building and buildings, and that it is in all buildings throughout the ages, not in a picked few, that we find the impress of man and his aspirations. For us, in this volume, architecture is the art of building and of disposing buildings. Good architecture is masterly structure with adequate workmanship; the highest architecture is likely to have fit sculpture and painting integrally bound up with it.

* * * * *

If architecture was born of need it soon showed some magic quality, and all true building touches depths of feeling and opens the gates of wonder.

The men who first balanced one stone over two others must have looked with astonish-

ment at the work of their hands, and have worshipped the stones they had set up. Any primitive work of man was more than his own, it was something found out; and who can say how much wonder at the magic of art was associated with the "worship of images"? In becoming fit every work attains some form and enshrines some mystery; to the shipwright his work was a creature. If Stonehenge is so amazing to us, what a wonder-work must it have been to the men of our islands who reared up the mighty stones. This element of wonder lasted long through the ages, and it will persist while work is done in the old way by keeping close to nature and necessity. But there are some elements which seem to have disappeared for ever; such are: ideas of sacredness and sacrifice, of ritual rightness, of magic stability and correspondence with the universe, of perfection of form and proportion. Wren, philosopher as he was, decided that man's delight in setting up columns was acquired through worshipping in the groves of the forest, and modern research has come to much the same view, for Sir Arthur Evans shows that in the first European age columns were gods. All over Europe the early morning of architecture was spent in the worship of great stones.

* * * * *

No recipes can be given for producing fine architecture. In a noble living school, size, splendour of material, accuracy of workmanship are graces, but the less there is of these in an essentially mean building the better. When we are going in the wrong direction the right things are on the left. It is all a question of the quality of the effort over a long period of time.

The powers of all architecture are limited by the materials in general use. If it be forest country, wood would be the chief material; if it be rocky, stone buildings would be early developed; if these materials are difficult to obtain, there is yet another to fall back on—this is clay, the importance of which in forming architectural elements is often overlooked, although in the shape of burnt brick it is still to-day our chief material. These different forms of matter give rise to three types of construction: wooden, by beams jointed together into framing; stone, by blocks assembled together, either balanced only, or linked by cramps or by cementing; clay, by continuous aggregation.

Ancient bricks were not burnt, they were dry mud and they were bedded in wet mud, so that the whole became one mass; in modern brickwork the cementing should be as strong as the brick, so that the wall becomes continuous.

Even when wrought stone has been generally used for ceremonial architecture, wood and clay have remained in the background as valuable materials useful for secondary purposes.

The decorative elements of architecture find their origin in delight in finish, colour and variety; in survivals from an earlier type of building, as wooden details copied in stone; or they were more or less pictorial. Such

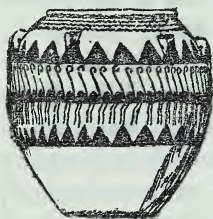


FIG. 1.

decoration itself had a utilitarian purpose, generally that of carrying over the virtues of the things imitated to the things made. As Capart says, the recent discoveries of prehistoric art in Egypt "enable us to establish the utilitarian

origin of the manifestations which we group together under the name of æsthetic. This utilitarian purpose is in almost every case confused with a religious or rather with a magical purpose."

The earliest pottery carries forward either the forms of gourds or of baskets. Even such a rudimentary "pattern" as the spiral seems to have originated as an imitation on clay pots of the shells in the handsomer hard stone vases. Generally speaking, a "pattern" is a simplified or repeated "picture." Fig. 1

shows the decoration on a prehistoric pot from Nagada restored from some fragments of mine. The ornament consists of flamingoes between two rows of mountains. The whole may be a shorthand picture of the Nile.

CHAPTER II

ORIGINS OF ARCHITECTURE

ONLY by searching out origins can we discover the initial force which carried art forward. In the main we find two great factors, response to need—the basis in utility—and, secondly, a magical and mystical element. The need, of course, may go far beyond the provision of daily bread and shelter; the Egyptians, for instance, wanted an indestructible resting-place, and so made the pyramids. The magical instinct, in seeking to re-create types and to set up sympathetic relations, led to imitation, to ideas of proportion, and to a search after perfection.

The first great need of all architecture is need itself, honest response to high necessity. Taste, caprice, pomposity and make-believe are no true art-masters. All formulas, codes and grammars are diseases which only show themselves in a time of impaired vitality.

Before the historical period made known to us by chronicles and inscriptions long ages shade off into the gulf of time; ages which in some degree may be reconstructed from the

remnants of man's art. For Europe the opening of the historical period may be put at about 1000 B.C. The earliest examples of prehistoric art known in Europe are the drawings of animals made by the cave-men at a time that must so long have preceded writing that we must look on drawing as an outcome of a desire to imitate and a natural aptitude. Drawing, indeed, was the parent of writing.

In the year 1832 the Danish scholar Thomsen made a great generalization as to the early history of the arts in determining three periods which followed one another: the stone age, the bronze age, and the iron age. Iron only came into general use at a time about coincident with the beginnings of European history. Before this there was a long period when tools and weapons were made of bronze, and still earlier they were of flints and stones. The farther we go back in time the greater, we may assume, was the relative importance of the arts. Here, as elsewhere, there is a law of diminishing returns. Early inventions must have seemed like revelations, and skilled craftsmen were looked upon as magicians. The art of building seems first to have gathered power and to have arrived at what we may call self-consciousness in the valleys of the Nile and of the Tigris. The relations between the arts of these great

river valleys has not yet been fully worked out. It is certain that they resemble one another closely in many respects; possibly the art of Mesopotamia preceded that of Egypt; but by the Nile a large class of prehistoric works has been discovered which has as yet no parallel in western Asia. Perhaps the mud of the great rivers has been the most precious of Nature's gifts to man. By the Nile, as a result of its miraculous fertility, he may first have learned agriculture and the art of casting his bread upon the waters. Herodotus says of the Egyptians, "They gather the fruits of the earth with less labour than any other people." With agriculture and settled life came trade and the stored-up energy which might essay by erections on the face of the earth to improve on caves and pits and other primitive dwellings. By the Nile, perhaps, the people first aimed to overpass the routine satisfaction of the barest need.

Long before dynastic Egypt was in being a strong people inhabited the land who developed many arts which they handed on to the pyramid-builders. They formed a wonderfully artistic stock, although they were only semi-naked "savages," using flint instruments and painting their pottery and buildings in a style a good deal like bushman art. They wrought most beautiful vases of fine marbles "quite modern" in form; and they

appear to have invented square building. At the British Museum and the Ashmolean are excellent collections of this pre-dynastic art.

It will be necessary to give a disproportionate space in this little book to early days in Egypt, for here we shall best find the origins of architecture as a whole, and origins are of great importance for framing a theory of art. As Prof. Petrie says, "We know more details of the origins of the arts in Egypt than in any other land. To-day we can show how every feature arose, and we can date, to a single generation, the adoption of stone for building."

A few years ago it was thought that nothing Egyptian existed earlier than the Great Pyramids of the Fourth Dynasty; now many works of art of the first three dynasties have been identified, as well as large classes of pre-dynastic and primitive art. The question of Egyptian chronology is as yet troubled by controversy. It is founded on ancient lists of the kings with the terms of their reigns. The sequence of the names is becoming sure, but the length of the reigns is very uncertain. Estimates vary from about 3000 to 5500 B.C. for the beginning of the First Dynasty. The system of Brugsch, adopted with modifications at the British Museum, opens the First Dynasty at 4400. It has been found possible to check the dates as far back as the beginning of the Eighteenth Dynasty, with the result

that this has been reduced from about 1700 B.C. to about 1580 B.C. Again, German scholars have brought to bear some astronomical facts, and as a result they place the beginning of the dynasties at 3315. This estimate is known as the Berlin system. I am incompetent to appreciate many of the highly technical arguments involved, but such rough tests as I have been able to apply incline me to the view that the Berlin system is likely to be right. Thus, taking the kings as given by Dr. Budge in the official publication of the British Museum, we have eighty-three kings in the 1260 years from 1600 (or 1580) to 340 B.C., giving an average of a little over fifteen years. Now, the reigns given for the early dynasties average much longer. Prof. Petrie names twenty-seven kings as having reigned during a period of 779 years—that is, for the first three dynasties. This results in an average of about thirty-three years, and it looks as if the estimate had been framed on the supposition that three kings filled a century, the ordinary rough rule of the succession of generations; whereas, for the better-known period they average less than half this.

American scholars adopt the German system without question, and there are signs that this chronology is being accepted by English writers. In a volume published about four years ago by Mr. King, of the British Museum,

although he avoids any set discussion of the question, he incidentally dates works of the early dynastic period as "about 4000," while Mr. Griffiths, in the new *Encyclopædia Britannica*, approves with some small reservations the shortened scheme. Prof. Petrie, on the other hand, still adheres to the longer chronology, but, with this great exception, we may say the general view at the present time is that the first dynasties fell in the period 4000-3000 B.C.

For Egyptian art, therefore, it will be necessary to speak of dynasties, not of years. In general terms it is usual to call the first three dynasties the Archaic Period, dynasties four to six the Old Kingdom, dynasties eleven and twelve the Middle Kingdom, and the dynasties later than the eighteenth the New Kingdom. The history of the two intervals is extremely uncertain.

The great era in Egyptian art, the time when it was in its first maturity but still eager and experimenting, covered the last years of the pre-dynastic period and the first four or five dynasties. All that is fresh and vital was discovered before the Old Kingdom came to an end. This was a time of passionate activity, a period of unparalleled significance in the development of culture. Writing was introduced, the state was consolidated, the arts flourished.

The most primitive works of man found in Egypt are flint weapons, rude pottery, and some graves. The first dwellings were probably round huts covered by a cone of reeds. Although the circular form passed out of use in more formal works, it always remained in the background for granaries. Pottery was made round long before it was thrown on the wheel, and it is as natural that the hut for holding people should be round as it is for pots, baskets, and nests.



FIG. 2.

The materials most ready to hand for the construction of primitive dwellings were reeds, river-mud, and palm-branches. Huts built of reeds seem to be represented on some early relief carvings, as, for instance, on a slate palette in the British Museum (fig. 2). The earliest structure actually discovered, a pre-dynastic tomb found in the sands at Hieraconpolis, is already right-angled. Modern people take squareness very much for granted as being a self-evident form, but the discovery of the square was a very great step in geometry. The square hieroglyph of a later time represents a mat, or other woven thing, and doubtless the square arose in weaving. May we not suggest that at first square rooms were built for mats ?

The tomb at Hieraconpolis is sunk in a pit,

and the walls lean outwards against the sand. Many early tombs of about the First Dynasty have been explored at Abydos, and the earliest of these were of much the same form as the tomb at Hieraconpolis. From the First Dynasty onwards it became more customary for the tombs to be built above the ground as almost solid masses of crude brick. These bricks were only dried in the sun, their use was a developed form of mud building. In these "mastabas," as such tombs are called, the walls also lean against the mass of material, which in this case, of course, is within—and very reasonably—for they are practically "retaining walls." This battered wall later passed into stone structures and became typical in Egyptian architecture. Some immediately pre-dynastic tombs had their chambers neatly lined with wooden planks, or, rather, a chamber of wood was first built, and it was then enclosed with brickwork; these crude brick walls around the pit "were only a protective shell around the wooden chamber which contained the body." Doubtless houses for the living as well as those for the dead were at this time constructed of wrought timber. Some representations of shrines and buildings on early objects appear to show wooden structures, and it seems in the nature of things that woodwork would be accurately wrought long before any buildings

were made of cut stone. In these representations we already find posts which are the prototypes of later stone columns, having swelling projections at the top like capitals.

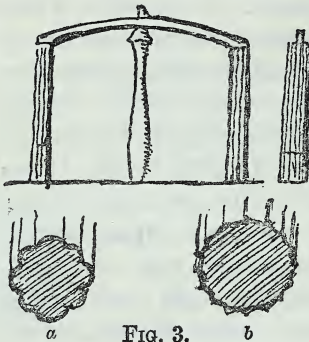


FIG. 3.

On inscriptions from the First Dynasty we often find a sign (read "tent") like m except that the horizontal bar is curved. The same symbol on many monuments of the Fourth Dynasty shows that the central upright was a slender pillar and that the

side walls and curved roof were made of bundles of reeds bound together in rolls, and such a construction would well explain the curved roofs (fig. 3).



FIG. 4.

Compare a shrine on the late papyrus of Ani at the British Museum. The walls and roof would have been embedded in a daubing of clay. In any case, the central upright was a wooden post, and in some carefully executed hieroglyphs it is shown with the shaft shaped into a baluster form and having a slightly projecting capital. Such a wooden tent pole was the first column; except, of course, the mere rough post (fig. 3). They were circular, and the

“capital” was not a separate member but only a projection on the post, probably to prevent the horizontal reed bundles from slipping. These early indications of the forms of the first Egyptian pillars have been very fully studied by Foucart, who shows that the later stone columns derive from such wooden originals.

Decoration, as we have seen, is frequently a survival of what had a function which has been forgotten. The beautiful archaic carved mace-head in the British Museum (fig. 5) obviously imitates the way in which earlier clubs were made. The pattern carved upon it later became well known as the guilloche. Even before the dynasties it was usual to construct rich furniture with legs like those of bulls, of carved ivory, a fashion which has persisted ever since. A class of archaic rock-hewn tombs at Gizeh and Sakkara had their ceilings cut “to resemble small palm trunks,” that is, I suppose, into a series of half-rounds like a fragment in the British Museum. This fragment seems to be a projecting eaves, or cornice; if so, it is the prototype of all dentilled cornices.



FIG. 5.

A very curious type of wall ornamentation characterized the first architectural style.

This is the recessing of the wall-surfaces in a succession of vertical channels. This tradition was constant during the first five or six dynasties, and left its mark in long subsequent time. It was elaborated and fixed in structures built of crude brick, but the idea of vertical division may have been taken over from reeds or timber; in any case this method of building is likely to be used in dealing with fixed units of material such as brick, as, for instance, old English chimneys. Fig. 6 gives the plan of the exterior of a fine first-dynasty mastaba at Gizeh. Later, in the



FIG. 6.

Fourth Dynasty, these walls got copied into stone on the exterior of other mastabas, also on the walls of the chamber in the Third Pyramid, and even to miniature scale on sarcophagi. One reason for the popularity of the treatment may have been that each recess became a "false door," and false doors seem to have had an important significance in tombs. Each recess of this kind in the Third Pyramid is crossed by a roller-like member near the top, which appears to represent a pole to which a curtain would be attached in a real doorway. The series of recessed fasciæ of the classical door-jamb possibly derives from the Egyptian "false doors."

The earliest-known moulding is a "roll"

used horizontally, or up the angles of structures. It is usually crossed by lines like binding-cords, and it must derive from the stiffening rails and angle pieces to which reeds were bound. This original source seems to be represented on the small relief of a hut on the slate palette in the British Museum (fig. 2). In the Fourth Dynasty the typical Egyptian "gorge" cornice appears, which is the oldest of all moulded cornices. The lid of the sarcophagus in the Third Pyramid was of this form (fig. 7). According to Prof. Petrie, this gorge derives from the nodding crest of a palm-branch hedge, but this explanation hardly seems to account for the fact that works of the Fourth Dynasty are usually finished along the top by a band of vertical "reeding" with an XXX pattern beneath it. This may be traced back on the representation of buildings on objects of the first dynasties, and when we find on the earliest example known of the gorge that the vertical divisions do not suggest leaves, but are rounded like the "reeding," it seems that the only new feature is the projecting curve in place of the vertical band. Perhaps the vertical strip of "reeding" was a perspective representation of an eaves of pole-ends, and that the gorge is a com-

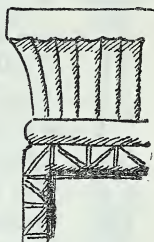


FIG. 7.

promise between the horizontal and the vertical.

In the pre-dynastic age hard stone had been cut with wonderful precision into vases of various forms. In building wrought stone seems to have been first used during the First Dynasty; a pavement of fair stone slabs has been found of this age. During the Second Dynasty the erection of buildings throughout of hewn stone began. This was a remarkable innovation.



FIG. 8.

Representations of columns have been found on objects which date from the first dynasties. In the early tombs of Abydos models of fluted and reeded circular pillars were found, and the hieroglyphs of the third and fourth dynasties show fluted posts and other columns of a tent-pole type having a swelling profile something like a baluster (fig. 3). Amongst the hieroglyphs at Meydum—third or fourth dynasties—is one of a column-like object having the baluster form, a spreading capital, and the lower part of the shaft wrapped with triangular leaves. It is the “papyrus sceptre,” and it is so exactly like later columns, and so fit to be adopted as a column, that we may hardly doubt that even at this early time the tent-pole columns were completed by painting in a similar way (fig. 8). Indeed, is it not probable

that the papyrus sceptre is a model of a tent-pole column? The German excavations at Abousir have recently brought to light several stone columns of the Fifth Dynasty which have swelling profiles, their lower ends wrapped with leaves, and papyrus-blossom capitals which are stone renderings of the same type. Many fifth-dynasty capitals, somewhat similar to these last, but formed of groups of lotus-buds, have recently been discovered. Prof. Petrie brought one back two years ago which is now at Manchester (fig. 10). A very simple capital of this type now at Dresden is shown in fig. 9.



FIG. 9.

Another form of stone column, also of the Fifth Dynasty, was in general use. The circular shaft of this diminished upwards to the upper quarter, which spread again in a graceful curve which was carved into palm leaves. Several capitals of this kind have been found at Abousir, and there is an example of this type of column from the pyramid of Unas in the British Museum (fig. 11). The whole is a monolith, the capital not being yet divided from the shaft except by a carved band representing a binding of rope, the prototype of the necking moulding under later capitals. This binding-cord suggests an ultimate source for



FIG. 10.

such capitals in a fashion of tying flowers to the posts of huts and shrines, or at least of painting flowers and bindings on the "capitals" of the wooden columns. Stone columns required no bases, but wooden posts rested on low, round, stone blocks, and these were later brought into stone-building.

In the Fourth Dynasty the Egyptian architectural style was fully formed. Works of this time are more intelligible and more universal than later ones, in which the hieratic quality—the especial Egyptian flavour—is more in evidence. Sculpture was an advanced art in the first dynasties. At the British Museum is a fine ivory of a first-dynasty king. As Prof. Petrie says, "the civilization that we find before us in the earliest-known history

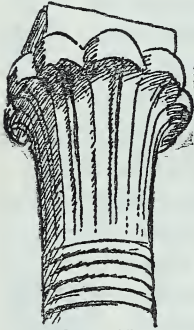


FIG. 11.

appears elaborate and perfect. . . . Few discoveries of importance were made during thousands of years which ensued." The hieroglyphs at Meydum showed that at the beginning of the Fourth Dynasty "nearly all the conventions were already perfected." Representations of the Uræus and the Winged Disc, which became so characteristic in later days, are found on works of the early dynasties. From prehistoric days buildings were

whitened and painted. The interior of the tomb at Hieraconpolis had its walls painted with ships on the river, and with hunting scenes on its banks. The exteriors of crude brick buildings were plastered and coloured in bands. Such colouring appears on a fourth-dynasty "false door" in the British Museum.

CHAPTER III

EGYPTIAN MONUMENTS—TOMBS, PYRAMIDS, OBELISKS, TEMPLES, HOUSES, TOWNS

As Egyptian architecture matured, the people, or rather their rulers, more and more magnified the tombs where they were to lie and to be worshipped after their death. The art which had been developed joyously was too soon imprisoned by ritual rigidity and frozen by a dead hand. I remember a drawing of an archæologist turning away from the Great Pyramid with the remark, "It's too late," and, indeed, these colossal works seem to have crushed the fresh life out of the people. Before the pyramids were built the tombs had become large and splendid. Each contained a strongly constructed tomb-chamber, hidden in the midst of a great mass of brickwork, often upwards of 200 feet long, sometimes 300 feet long and 150 feet wide.

The finest tombs of this—the mastaba—type were explored at Meydum, first by Mariette, and then, more carefully, by Prof. Petrie. The tomb of Nefermatt had its walls covered

with scenes and hieroglyphics, which were carved into the stones and then filled level with coloured mastics, so that all the detail appears as in a painting. One of the stones, on which a flying duck is wonderfully rendered, is in the British Museum, and at South Kensington are fragments of paintings, also a full-sized copy of six geese, which are strangely like a fine Japanese drawing. (See the woodcut in Loftie's *A Ride in Egypt*.) Near by, in another mastaba of the same age, the end of the Third or early years of the Fourth Dynasty, were found the two marvelously life-like statues of Ra-Hotep and his wife Nefert, works wonderfully bright and sweet which retain the dew of art's morning.

It had been the custom to enlarge these mastabas by successive thick coatings of brickwork, each sloping at a steep angle, usually of 4 to 1. It is now well understood that the pyramids are practically great mastabas, and it is held that the actual stages of transformation are left for our instruction in the "Stepped Pyramid" at Sakkara, and the curiously built pyramid at Meydum.

Although a whole library of books on the Great Pyramid exists there is no good complete study of the entire subject, and as these are the earliest great architectural monuments it will be well to discuss them at some length. In the Third Dynasty two or more neighbour-

ing mastabas at Sakkara had been buried in a great mass which not only enclosed but surmounted them, falling back by degrees in a series of terraces. This is known as the Stepped Pyramid. It is not even square on plan, being upwards of forty feet longer in one direction than the other. It is a colossal mastaba rather than a pyramid, although obviously it was the parent of pyramids. There is no doubt that it is of earlier date than the other pyramids. It is the only one which does not face the cardinal points accurately, being about four and a half degrees out in its lines. It was built by a king of the Third Dynasty, whose name was many times repeated on the jamb and lintel of a doorway in the inner chamber. The walls of this chamber were covered by small green glazed tiles about 2 × 3 inches slightly convex on the face. A few of these tiles are in the British Museum, and many others, with the stonework of the doorway, are in the Berlin Museum. The soffit of the doorway is carved into a representation of stars; and other fragments found suggested that the ceiling of the chamber had had similar decoration. This scheme of making the ceiling a sky has persisted ever since. Similar green tiles have been found at early sites, and it is not now doubted that this remarkably beautiful chamber really belongs to the Third Dynasty. Of similar

tiles found at Hieraconpolis, Mr. Quibell remarks that "their position showed beyond doubt that they were not later than the Old Kingdom."

The exterior of this pyramid is built of roughly squared stones "set to the angle of the face," that is, declining inwards. The mass is of rubble masonry in a series of coatings contained by walls nine feet thick of the better masonry, which lean inwards at the mastaba angle (here $73^{\circ} 30'$). These walls rise from the foundation, but each one decreases in height the farther it is from the central core, so that the several terraces are successively about thirty-four feet lower each than the other. It is 351.2 feet from east to west, and 398.9 from north to south. Perring says, "the breadth from north to south has apparently been increased by an additional wall on those sides," but no evidence for this appears. It is now generally agreed that it was not designed as a true pyramid.

A ruined structure at Meydum seems to have been the first pyramid proper; it was built at the end of the Third Dynasty or by the first king of the Fourth. It also was built in inclined layers, but it was square and was completed by a continuous casing sloping from the base to a point. Prof. Petrie in his latest study of the subject considers that he has found sufficient evidence to show that

it was only after several coatings had been completed in preparation for finishing it as a stepped structure that a change of scheme was made with a view of completing it as a pointed pyramid. Thus the faces of the several terrace walls are finely dressed masonry. Prof. Petrie discovered the *external* sloping casing of fine masonry several years ago. In his recent re-examination of the base of this pyramid he found several of these stones marked with a rough sketch of a stepped pyramid. This suggests that even when these stones for the casing of a true pyramid were prepared, the monument where they were to be used was known by an ideogram representing a "stepped pyramid."

The method followed at Sakkara and Meydum of building in inclined coatings seems to be a reasonable one for the erection of pyramids proper, for it was followed at Abousir and Lisht. The angle made by the casing of the completed pyramid of Meydum resulted in giving a ratio, between the sum of the four sides and the height, of 44 to 7—that is, the ratio between the radius and the circumference of a circle. The Great Pyramid of Gizeh, which followed that of Meydum, has exactly the same angle, and Prof. Petrie considers that the coincidence with the ratio of the radius to the circumference of a circle is intentional. That the Great Pyramid has

exactly the same angle shows that it was copied from the finished work at Meydum, but it does not show that there was any meaning attached to the ratio of height to base.

The simplest supposition would be that the angle was given by considering the general slope which would include the several terraces with just a little adjustment to allow of the use of whole numbers, as seven of height to eleven of base. The tendency of pyramid design seems to have been to attain height, to build a structure that should reach to heaven. At Sakkara terrace was piled on terrace, at Meydum and the Great Pyramid the finished angle was nearly 52° . The ideal pyramid, as depicted in the hieroglyphs, was very acute from the earliest time. Obviously, in a progression from the pyramid of Sakkara to the Second Pyramid at Gizeh, which rises at an angle of over 53° , the angle giving the ratio of the radius to the circumference of a circle was reached accidentally. The general angle of the Sakkara pyramid, which would include the terraces, is about 49° ; Meydum and the Great Pyramid, $51^\circ 52'$; the Second Pyramid, $53^\circ 10'$; Dahsur, steep part at bottom, 55° , flatter part at top, 45° .

Again, it would have been curious to make this particular ratio subsist between the height and the *square* measure round about

the base; it would have been a more striking coincidence if the correspondence had been with the inscribed or circumscribed circles of the base—that is, there are three chances for those who would find just this ratio in the pyramid. If we consider all the chances of relation between the half base, the base, the diagonal base, the vertical height, the slope height, the diagonal height, we should probably be justified in assuming that this particular ratio is fortuitous.

Given the two conditions of desire for great size and for the utmost durability, the pyramid form was the most perfect solution possible.

The Great Pyramid at Gizeh, named “the glory of Khufu,” “the greatest and most accurate structure ever built,” is about 480 feet high and seems more like a hill of stone, rising as it does from a base of over thirteen acres, than like an architectural work. When it was new and sharp it must have gleamed cold and white like the peak of an alp rising above the burning golden sand. Some casing stones were found around the base by Howard Vyse. They were large blocks, the one of which he gives the dimensions being 4 feet 11 inches high, 8 feet 3 inches on the bed, and 4 feet 3 inches on the top from back to front, showing 6 feet 3 inches on the slanting face. Of these stones there are some fragments

at the British Museum. The pyramids stood within large square paved courts, surrounded by walls, and each one had a temple attached to it on the east side, where offerings were made to the dead Pharaoh.

The effort required for the erection of such works seems incredible. According to Herodotus an inscription on the Great Pyramid told that 16,000 talents had been spent on the radishes, onions and garlic eaten by the workmen. This must be an example of the myth of cost, and is, indeed, explained by his own comment, "If this be so, how much besides," etc. A similar story is told of Rome: Heliogabalus, it is said, gathered and weighed all the cobwebs in the city, so that its size might thus be inferred.

Another myth concerning construction is accepted by many writers, including Perrot and Maspero. The sloping casing, they say, was begun by setting the apex stone and continuing thence downwards. It surely would be a useless miracle to handle such big stones in such a way. Choisy minimizes the story to mean that the casing was fixed as square blocks, and dressed to the slope afterwards, but Howard Vyse long ago pointed out that the casing was fixed "roughly cut to the proper angle," and that the fine dressing only was executed in place, as cleaning-off; and this view has been confirmed by Prof. Petrie.

It would have served just as well for convenience to leave the casing blocks square on one side only, or, indeed, to have left such a step-way, say twenty feet wide, up one side. We may suppose, then, that one or two per cent. of the casing was left up in steps temporarily on the side facing the road by which the casing-stones arrived.

The final dressing to a fair plane surface seems to have been done with the assistance of some scaffolding. Perring says that at Dahsur there were "puttock holes" in the casing-stones for supports used when the dressing-off was done, and the holes had been very neatly filled up with inserted blocks. Many of the lower stones in this pyramid were, he found, joined together by stone dovetails. The analysis of pyramid construction as given by Choisy is most suggestive. Although it is only a sketch, it indicates how these man-made hills had to be built.

At the north pyramid at Dahsur Perring found the apex stone (the slope was 45°). It was of one block 4 feet 9 inches high. The course beneath was of four stones of the same height, the other courses were less.

A pyramid was not a solitary monument—it was supported, like a cathedral, by many subsidiary buildings and rose within a paved enclosure; round about was a whole necropolis of mastabas. A college of priests was

attached to its service, supported by an endowment of lands. The Great Pyramid and its two companions at Gizeh were built within a century and probably by one family—a father, son, and the latter's grandson. According to Maspero, the lower rock-hewn chamber below the Great Pyramid belongs to an earlier tomb which is embedded in the superstructure. It has been much discussed whether this pyramid was built according to a first design or whether it was enlarged by successive works. Dr. Borchardt, the architect to the German mission, gives evidence to show that it was altered and enlarged.

A recent campaign of excavation by Germans, Americans and Italians at the pyramid area has resulted in showing that besides the temples directly to the east of the several pyramids there were others in the valley near the causeways leading up to the pyramids. The granite temple close to the Sphinx belonged to the pyramid of Chephren. Prof. Petrie long ago showed that it was built in connection with the causeway, and was the work of Chephren. The interior was lined with red granite. The exterior was a square mass, the walls channelled into "false doors" and with a paved terrace roof. The Third Pyramid had a similar second temple, which had never been completed. In its ruins were found magnificent statues of Mycerinus. It

is most probable that the Great Sphinx, which is close to the lower temple of the Second Pyramid, at the side of the causeway leading to it, was sculptured out of the rock as the guardian of the sacred precinct. It is a lion with the head of King Chephren. The roadway has paving which is cut into the rock; it doubtless continued to a water-gate on the bank of the Nile.

At Abousir a German expedition has recently carefully explored a group of fifth-dynasty pyramids. They are of great importance, for the temples and subsidiary buildings were well preserved, together with long covered passages which led up from water-gates. In the Berlin Museum there is an admirable restored model of these. The water-gates were noble works with columnar fronts like Greek propylæa.

A long series of discoveries has demonstrated how the primitive grave developed into the mastaba, how the mastaba grew very large and became transformed into a step-pyramid, and how that passed almost accidentally yet inevitably into the true pyramid, a perfect final form. Such accidental development leading to such an ordered end has ever been the law of architectural growth; nothing of true worth has ever been invented of *malice prepense*. Evolution was along the line of increasing bulk and the

effort after durability ; these produced the pyramid.

Within these enormous masses were only one or two small chambers, one of which contained the sarcophagus. They were reached by passages planned in a strange way and defended, so that the sepulchral chamber should be inaccessible. The pyramid of Meydum was penetrated by a passage sloping down from the north side ; beneath the centre of the work it reached the bottom of a vertical shaft, which thence ascended to the floor of the tomb. The external opening in the side of the pyramid was probably closed by wedged stones.

At the Great Pyramid the entrance was in the eighteenth course on the north side. From it a passage descended into a chamber cut in the rock. That seemed to be all, except that about sixty feet from the entrance there was a great block of granite showing in the ceiling of the passage. It was too hard to be cut through, but the old pyramid-breakers mined a way by the side of it into an ascending passage. At the upper end other obstructions barred the way, for the tomb-chamber was cut off from the passage by four heavy blocks which had been suspended in suitable cavities. When the original workmen withdrew they removed the props and the blocks fell like portcullises. Choisy suggests that in so

dealing with great stones the craftmasters used sandbags, which, slowly giving out their contents, allowed the stones to fall into their place gently. In the pyramid of Dahsur the cavity for the portcullis rose obliquely at the side, so that the massive sealing stone slid down the incline and closed the passage, as was clearly explained by Perring in the standard English work on the pyramids. Here the outer end of the passage was closed by a block adjusted on pivots. The entrance was so well concealed on the exterior "as to have escaped the closest examination."

One of the mysteries of these buildings is why there was all this complexity of contrivance, why the passages were not merely regarded as temporary ways to be built up solid. Prof. Petrie has suggested that the passages remained accessible to the priests, but if so, why was the fine ascending passage of the Great Pyramid cut off? Is it not probable that the endeavour was to confuse evil spirits? In any case the problem is one which is inherently fascinating, especially to young minds—the mystery of the secret chamber. Such preoccupations probably gave birth to the idea of the labyrinth, which as a device appears on Egyptian scarabs. Prof. Petrie has lately published a small ivory tablet of the Twelfth Dynasty on which a labyrinth is rudely incised.

The twelfth-dynasty pyramid of Illahun had its entrance in a well forty feet deep, from which a passage hewn in the rock led to a chamber from which access was gained to another chamber of red granite, from the north wall of which "a strange passage is cut in the rock, first northward, then west, then south, then east, and lastly northwards again, opening into the limestone chamber." It passed right round the granite chamber and looked as if it were intended to prove that there was no other passage.

The interior of the pyramid of Hawara (Twelfth Dynasty) is described as elaborately arranged so as to deceive and weary the spoiler. The mouth was on the ground level on the south side, a quarter of the length from the south-west corner. "The original explorers descended a passage with steps to a chamber from which apparently there was no exit. The way consisted of a sliding trap-door, however, and breaking through this, another chamber was reached at a higher level. Then a passage opened to the east closed only with a wooden door, and leading to another chamber with a trap-door roof. But in front of the explorers was a passage carefully plugged up solid with stone; this they thought would lead to the prize, and so all the stones were mined through, only to lead to nothing. From the second trap-door chamber a passage

led northward to yet a third such chamber. From that a passage led west to a chamber with two wells, which seemed as though they led to the tomb, but both were false. This chamber also was almost filled with masonry, which all concealed nothing, but had given plenty of occupation to the spoilers who removed it in vain. A filled-up trench in the floor really led to the sepulchre; but arriving there no door was to be found, as the entrance had been by the roof, an enormous block of which had been let down into place to close the chamber. So at last the way had been forced by breaking away a hole in the edge of the glass-hard sandstone roofing-block and thus reaching the chamber and its sarcophagi." Prof. Petrie exhibited this year (1911) a model of a tomb with such small winding passages, and traps, that he had indicated the true way by a thread, taking a hint from the story of Ariadne.

Obelisks are almost as mysterious as pyramids. The early shrines shown on objects of the first dynasties often have pairs of masts or posts standing before their fronts, and the proper function of obelisks is to stand in pairs before the great eastern gates of the temples. Small obelisks have been found in tombs of the Old Kingdom, but the earliest of the existing great obelisks belongs to the Twelfth Dynasty. In the design of the typical

obelisk there has evidently been some borrowing from the pyramid; it is an immensely tall, double-angled pyramid of one stone. In the obelisk is embodied another structural ideal, the delight in balance. The noble materials which the Egyptian architects controlled made it possible to set up obelisks over 100 feet high. Their apices were frequently covered with gilt copper, or they were entirely gilt so as to flash in the sun. They may have been boundary stones in origin, but they came to have some symbolic relation with the sun. They are perfected monoliths, in part the outcome of an ineradicable tendency to worship big stones which has always been one of the forces at work in Architecture.

In Egypt from the earliest time it had been customary to bury gifts with the dead and to make offerings at their tombs. In the pyramid age the service of the royal tombs was regularly endowed and each pyramid had a temple attached to it. The gods had shrines from the first dynasties or even earlier. In the British Museum is the inscribed part of the fourth-dynasty tomb of a priest of the gods Seker and Tet and overseer of the works in the palaces and temples. Foundations of a temple of the first dynasties have been discovered at Abydos.

The remains recently explored at Hiera-

conpolis of a temple built over an earlier stone-faced mound suggests that the primitive holy places were shrines set on platforms in enclosures. The fifth-dynasty temple of the sun at Abousir had a huge stunted obelisk set on the top of an almost cubical platform, the whole enclosed in a court. The fifth-dynasty pyramid temples at Abousir are highly developed with courts and colonnades. A column from the fifth-dynasty temple of Unas is in the British Museum (fig. 11). Considerable remains of the temple built by Pepi in the Sixth Dynasty show that it was about 50×40 feet, with colonnades and stone gateways. Thus the temple proper had been developed under the Old Kingdom.

Temples of the Eleventh Dynasty have lately been explored at Thebes and Deir-el-Bahri.

The better-known temples belong to the Eighteenth Dynasty; they were usually of great size and complexity, and consisted of a far withdrawn holy place, small and obscure, approached through a succession of large courts and columned halls, some open and others covered by platform ceilings of stone slabs, all arranged on a central axis which pointed to the sunrise. Before the outer gates were obelisks and avenues of statues.

Within all the wall-surfaces were covered by relief sculptures and paintings, which

followed a traditional arrangement suggesting a correspondence between the local habitation of the deity and the universe of which it was in some way the image.

The temple, says Maspero (1907), "was built in the image of the earth such as the Egyptians had imagined. The earth was for them a sort of flat slab more long than wide, the sky was a ceiling or vault supported by four great pillars. The pavement of the temples represented the earth, the four angles stood for the pillars, the ceiling, vaulted at Abydos, or more often flat, corresponded to the sky."

Each point received an appropriate decoration; from the pavement grew vegetation, and water plants emerged from water. Thothmes III had carved the herbs and beasts of the foreign lands which he had conquered. The ceiling, painted in dark blue, was strewn with stars of five points. Sometimes, the sun and moon were seen floating on the heavenly ocean escorted by the constellations, and the months and days. "The ornamentation was restricted to a small number of subjects, always the same."

The palaces were much lighter structures than the temples, and for the most part were built of brick and wood. With their courts, gardens, ponds, and dependent buildings they were enclosed within strong walls. The

ceilings, walls, and plastered floors were gaily painted with patterns or scenes. The houses had frequently two or three stories of rooms having windows of quite modern form. See a model of a house in the British Museum with a window divided by a little column, and another with two-light windows divided by transoms.

From pre-dynastic time Egyptian towns were built within strong walls, forming a square or parallelogram with defensive walk and battlements above. At Illahun, Prof. Petrie excavated "an unaltered town of the Twelfth Dynasty." It was square and walled and with regular streets. The larger houses had a court surrounded by columns with a water-tank in the middle.

CHAPTER IV

EGYPTIAN BUILDING—METHODS AND IDEAS

BESIDES the better-known pyramids and temples built of large blocks of stone, the larger number of common buildings in Egypt were constructed of mud brick and some poor and scarce timber. Vaults and arches are found in Egypt dating from the beginnings of dynastic rule, and rudimentary domes are probably as old. They are both primitive. The arch, as described in books, is an assemblage of large stone wedges put together without cement, remaining stable by the balance of parts. The arch was not so introduced into architecture. At the simplest, an arch is the upper part of a horizontal excavation in a mass of clay or gravel—a swift's hole in a sand bank, for instance. If the opening be gradually diminished upwards by slanting or rounding, and if the material is fairly compact, quite a big hole may be made without the mass falling in. In the simplest building, a vault is a convex shell of dried clay spanning an open space, by gradually bringing together a rounded continuation of the walls.

In building by an aggregation of material like mud, it seems to be quite natural to bring the side-walls together into the form of vaults. Such an "arch" has the properties of a bent beam—it is strong until it breaks up into sections; and every modern arch, so far as it is made homogeneous by cement is in a sense a bent beam—that is, the wedges do not act separately.

About ten years ago there was an interesting paper on primitive mud architecture in the *Journal of the Geographical Society*. Even the Prairie dogs build little domed structures and the Esquimaux construct domes of ice. When the use of mud-walling gave place to building with sun-dried bricks—that is, to mud which had been divided up into sections—it was easily seen that the continuous clay shell-vault might be successfully imitated in bricks. A man beginning a clay shell would do so against an end wall to which his first handfuls would be made to adhere while gradually rising from the sides. So the builder of brick vaults in Egypt and Assyria began at the end by slanting courses up from the sides so that they leaned against the end wall; each brick was laid flatwise on the slanting face left by the last course; it was stuck to it, as it were, by its broad surface. Thus the vault was brought along from the end without any "centring" by making each thin cake

of mud adhere to and rest against the slanting course last done. There was no thought of wedges, the vault was thought of as a continuous convex shell, although it was executed by assembling cakes of mud of a uniform size. The Romans developed this idea of the homogeneous vault in their magnificent concrete construction.

The wedge arch might have had an independent origin, for children playing with stones seem naturally to make experiments in bridging over voids; but the true arch of masonry appears late, and it seems to have been evolved in Egypt after the brick vault had been built for some two thousand years.

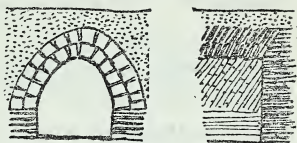


FIG. 12.

Prof. Flinders Petrie describes a tomb dependent on a fine first-dynasty mastaba at Gizeh as vaulted, and Prof. Garstang has excavated a number of vaulted tombs at Reququah which he assigns to the Third Dynasty. These tombs were small oblongs, sunk in the ground; the sides had walls, and they were covered by vaults in which the bricks were placed edgewise and leaning back at an angle against the end wall of the tomb. Sometimes the bricks were roughly cut to more or less of a wedge shape, and some

of the arches are rudely pointed (fig. 12). Stone-roofed passages of the Fourth Dynasty were at times hollowed out into the arch form, which shows how deeply by this time it must have got into consciousness.

At the twelfth-dynasty town of the builders of the pyramid of Illahun, Prof. Petrie found many arched roofs of brickwork, and the doorways were always arched.

Small circular "domed" structures of mud were probably known from the earliest time in Egypt. At Hieraconpolis several "shuna," or store-pits, of about six feet in diameter have been found which seemed to have belonged to houses of the pre-pyramid age. Some foundations of isolated circular buildings, probably granaries, were also discovered. In the Twelfth Dynasty domes were formed over the circular chambers within the small pyramids of this age. They are built of horizontal layers of brickwork, each course being of less diameter than the one below. They resemble the beehive tomb at Mycenæ, and, as Choisy remarked, "their likeness to pre-Hellenic domes cannot be fortuitous." The same author, judging from the paintings, thought it probable that the Egyptians covered square chambers with mud domes, which showed externally. This view is confirmed by some models of houses of the Tenth Dynasty found at Rifeh, which show

several varieties of vaulting; in some "the domed roofs are obvious." One model shows a terrace-roof with three little rounded cupolas just emerging through it, like a modern Eastern house (fig. 13).

The use of rude little domes for granaries was quite general. According to Perrot and Chipiez, "the granaries and store-houses were almost always dome-shaped . . . a sketch made in a tomb at Sakkara shows another form of granary shaped like a stone bottle"—that is, it had a sort of knob above the "dome"; these knobs are probably the far-off originals of lanterns on domes. It should be noticed that these granary domes were not spherical, but semi-eggshaped.



FIG. 13.

At Daphne Prof. Petrie explored the ruins of a fortress-palace built about 660 B.C. All that remained was a square mass of brickwork about 160 feet square; the interior was an irregular "gridiron" of thick walls, forming cells about ten to sixteen feet wide. Many were square, others were oblong; the latter formed "deep domed chambers or cells, which were opened from the top." They were much ruined, but several cells "in the best-preserved parts showed signs of the springing of domes in their corners; the corners are rounded and

gather in towards the vaulting." In answer to an inquiry, Prof. Petrie was kind enough to tell me further : " Egyptian doming of construction chambers is irregular, the sides contracting inwards while the corner increasingly rounds. For open chambers, I think the angles in each case are truncated by placing bricks across them." We have here the application of domes to square chambers systematically by means of gradually reducing the angles. However imperfectly they may have been executed, this is the system of the " pendentive."

Structures of crude brick were mud-plastered to protect them from the weather, and whitewashed and painted in stripes and simple patterns from the earliest days. Even some of the pyramids are built of mud brick cased in stone, that at Illahun has a framework of stone walling filled in with crude brick. In the Nineteenth Dynasty some works were executed in baked brick, but it was not in common use till Hellenistic days. The baking of clay was, of course, taken over from pottery. Some bricks enamelled a lovely blue have been found.

Masonry of all kinds, from rubble to fine ashlar in large blocks, was in use. It was bedded in plaster, or in a mortar of plaster, sand, and pounded brick. The masonry of the third-dynasty pyramid at Sakkara is set

in mortar. Fine masonry blocks from about the Twelfth Dynasty were linked by dovetailed cramps of stone or wood, or by metal cramps.

A curious manner of bedding masonry and brickwork in undulating courses is frequently found. The masonry at the pyramid of Sakkara rises towards the angles. Doubtless, the custom arose, as explained by Choisy, through building walls with strongly battered faces the beds of which sloped inwards; this made a difficulty of bonding at the corners which the tilting of the angles went far to obviate.

Other applications of the method are hard to understand. It was the custom in the Twelfth Dynasty to build walls in a corrugated form; thus they got elasticity and stiffness. The walls of the fortress of El Kab were built in this way on the west and north sides; on the east and south the walls were built in sectional lengths with vertical "straight joints" at intervals. These sections were bedded horizontally and in concave curves alternately. The breaking of the wall into sections allowed of contraction and expansion under the violent changes of temperature, and possibly the undulations contributed to the same end; where a wall was built on a slope, it was a provision against sliding.

Egyptian masonry was wrought at times

with astonishing technical ability. Hard stones like granite, basalt, and diorite were cut by means of long saws. Howard Vyse noticed that the basalt sarcophagus in the Third Pyramid had been cut by a saw. The tubular drill was also much used, and dishes and bowls of diorite were turned.

One ideal of the builders was the use of fine material, and the conquering of intractable substances; another was accuracy of workmanship.

Already when the pyramid of Meydum was built, the idea of accuracy had been carried so far that the bedding of the stones around the base varied in level only about a quarter of an inch in the 2000 feet; the joints are "under $\frac{1}{100}$ th of an inch." The stones were finished by the strokes of a small adze. "The laying out of the base of the pyramid of Khufu is a triumph of skill; its errors both in length and in its angles could be covered by placing one's thumb on them—the casing stones are so truly square that the film of mortar left between them is on an average not thicker than one's thumb-nail." The sepulchral chamber, of the twelfth-dynasty pyramid of Hawara was "a marvellous work"; it resembled a huge tank cut out of a single block of a hard quartzite sandstone, the internal size was 22×8 feet, and 3 feet of stone were left all round. The corners were so sharply cut that

at first it seemed that they must have been jointed; the whole "glassy hard" surface was polished. It was covered in by separate blocks.

Prof. Petrie considers that plane surfaces were tested by bringing them into contact with a true plane. Of the pyramid of Meydum he says: "On the stones may be seen the red spots of paint left from the testing by a red-dened trial-plate as on the stones of Khufu, at Gizeh." This became the Greek method of "the red canon." Such accuracy of workmanship is astonishing, and it must depend on some underlying idea which the builders sought to realize.

A further development in ideas of perfection is found in orientation—the feeling that the earthly building should be put into relation with its heavenly prototype the world-temple. The pyramid at Meydum fairly corresponds with the four aspects, and the Great Pyramids of Gizeh are almost perfectly adjusted.

In later Egyptian inscriptions relating to buildings, phrases often occur like "it is such as the heaven in all its quarters"; "firm as the heavens." The idea must have been that as the heavens were stable, not to be moved, so the building put into proper relation with the universe would acquire a magical stability. It is recorded that when Akhnaton

founded his new city, four boundary stones were accurately placed, so that it should be exactly square.

Minutely careful measurements have demonstrated that the Egyptians worked according to schemes of proportion, as part of these ideas for perfect building. A mastaba of the Third or Fourth Dynasty at Meydum has a breadth of 100 and a length of 200 cubits. Here lines 20·6 inches apart showed exactly what the cubit was. The slope was an angle of 4 to 1. Accuracy of form was so much desired that walls of L form were built outside each corner and on these the slope of the tomb was carefully marked with a red line. Both the pyramid at Meydum and the Great Pyramids at Gizeh had such a form that the vertical height compared with the measure round about the four sides was, as we have seen, as 7 to 44.

Here and elsewhere, the several dimensions of a work were set out with a big standard of measure so as to avoid fractional parts. This, indeed, seems to have been the substance of the idea: the parts were to be of known dimensions; there were to be no accidental quantities. "The dimensions of the pyramid of Meydum are 7 and 44 times a length of 25 cubits. Those of Khufu are 7 and 44 times a length of 40 cubits." That is, one was set out so that all the dimensions were

multiples of 25 cubits, and the other so that all were multiples of 40 cubits. At Dahsur the pyramid was designed on an even number of cubits, the base being 360 cubits, and the height 200, while the space walled in around it was 100 cubits wide. Another smaller pyramid near by had a base 100 cubits square.

In the twelfth-dynasty pyramid at Illahun was a beautifully worked granite sarcophagus of great "accuracy of proportion," each dimension being a whole number of palms, with an error of not more than one part in a thousand.

These results, worked out by actual measurement, coincide exactly with what is reported to us of Greek ideas of proportion—ideas based on the feeling that an object to be perfect must have all its dimensions related according to some scheme of simple measurement which avoids fractional parts. The builders, it is clear, had before them some idea of perfection, and endeavoured to realize a type which should rise above the accidental. In the Old Testament we find other examples of a similar mode of thought, both in the descriptions of the Tabernacle and of Ezekiel's temple. Modern Indian craftsmen seem to work according to the same tradition.

Perrot gives an interesting example of a builder's adjustment to disguise irregularity.

The two obelisks before the temple at Luxor were of different heights owing to some accident; one is 85 feet high, the other 78 feet. "To hide this difference they were set upon unequal bases, and the shorter obelisk was placed slightly in advance of the other." Such simple modifications show great mastery over effects which modern people find it very difficult to apply. A little humouring of this sort would have made Watts' fine statue in Kensington Gardens seem to stand at the centre of the radiating paths, but the problem was beyond our powers.

It is said that some of the obelisks have slightly curved instead of plane surfaces, and that lines in the plans of some of the temples are laid out in a just perceptible curve.

This pursuit of the ideal and the typical must have been related to the dominating desire for permanence. The inscriptions of the Pharaohs boast of their having founded "everlasting stone monuments," in honour of the gods.

Egyptian sculpture early matured, the most perfect age was at the end of the Third Dynasty and the beginning of the Fourth. The famous scribe and the more beautiful portraits of Rahotep and the lady Nefert are of this time. Quite recently some magnificent portrait statues of the pyramid age have

been found in the temple of the Third Pyramid. Some wonderful bronze statues of the Old Kingdom have been discovered at Hieraconpolis. Besides sculptures in the round, the Egyptians practised relief sculpture of exquisite delicacy, and the method of intaglio relief which was so suitable under the devouring sunshine.

Architectural painting did not consist only of the well-known friezes of battles and offerings, but many are of domestic and pastoral scenes, dancing and hunting pieces, animals and birds. The most remarkable are the well-known friezes of ducks of the pyramid age; the painted plaster pavement from Tel el Amarna of calves skipping amongst vegetation; and the ceiling from the palace of Amenhotep III (*c.* 1400 B.C.) of grey doves and red butterflies, flying across a pale-blue sky.

Besides painting and sculpture, many sorts of surface decoration were practised, such as polishing, gilding, the inlaying of wood with ivory, and of stone with bright-coloured faience. Casings of bright-green tiles were applied to walls in the first dynasties. At Abydos some tiles with figures in relief have been found which probably adorned a chamber of the time of Menes.

It is a part of my intention to try to point out what contributions were made to uni-

versal architecture by the several civilizations as they arose and passed away, but to do so of Egypt would be to practically re-write what has been said: to a large degree Architecture is an Egyptian art.

CHAPTER V

BABYLONIA AND CRETE—EARLY ART IN ASIA AND EUROPE

Two other schools of architecture—the earliest Asiatic style and the earliest European style—must also be considered, although less fully. Egypt, Babylonia and Crete were three centres of early civilization, representing Africa, Asia and Europe, which from an early period and for long acted upon one another.

Little or nothing is known of a primitive age in Mesopotamia. At a remote time the art of Babylonia was that of a civilized people. As has been said, there is great similarity between this art and that of early dynastic times in Egypt. Yet it appears that Egypt borrowed of Asia, rather than the reverse. If the origins of art in Babylonia were as fully known as those in Egypt, the story of architecture might have to begin in Asia instead of Egypt. The best general account of Babylonian art has been written by Perrot and Chipiez. A good English account of recent discoveries in western Asia was given

by Messrs. King and Hall in 1907. Written records seem to take us back to about 4000 B.C. Some writers think that metal tools were first used in Elam; if this was so it would give western Asia a strong claim to be the motherland of the arts.

A record of great interest only lately deciphered describes how King Gudea (c. 2700) rebuilt the temple of a high god and translated his image to it from a yet older temple. The new building is described as being like a mountain, terrible and strong as a bull. The doors were guarded by statues of heroes and monsters, and facing the rising sun the emblem of the Sun-god was set up. Within was a stone tank for water. The temple was surrounded by dependent buildings in an enclosed paradise, where trees and flowers grew around a large lead-lined tank. Here the birds flew unmolested. The plan of the temple had been drawn by one of the gods on a tablet of lapis-lazuli and revealed to the king. On the appointed day, at the first sight of dawn, the great god and goddess entered their new temple, "like a whirlwind, like the rising sun." Messrs. King and Hall speak of it as having been an immense building with numerous shrines and courts, and a high *ziggurat*, or temple tower, of several stories, each decreasing, one above the other. The little light that entered the interior through the

doorway would have been reflected in the basin of sacred water sunk level with the floor. The area covered by the buildings "must have been enormous." They included dwellings for the priests, shelters for the sacrificial animals, treasuries, and store-houses for the produce of the temple lands. It was evidently a great establishment; a temple of cathedral rank, not a mere shrine or chamber of offerings. The emblem of the Sun facing the east, and the entry of the god to his temple like the rising sun at dawn, shows that already this temple was built in correspondence with the greater world-temple.

If temples were thus highly developed at this early time in Babylonia, it seems possible that temples of the gods first appeared in western Asia, and from thence spread to Egypt and other countries.

At Nippur remains of an altar and of a massive brick building in which was an arch have been found which belong to an age earlier than the reign of Sargon I, which is put at about 3800 B.C. An inscribed tablet of this early age lately found at Telloh records the capture of a city and the burning of several temples, "carrying away the silver and precious stones therefrom," and destroying the statues. It would appear that Babylonia was a land of temples when Egypt was a land of tombs.

The results of the excavations carried on for a dozen years by a German expedition at the mounds of Babylon have just been published by Prof. R. Koldewey. Four temples were explored. They were of brick, and consisted of [a number of chambers surrounding a great court which was entered through towered gateways. The gates had bronze pivots turning in stone sockets. The courts were paved with brick covered with asphalt. The chief chamber or cella gave evidence that here had been an image of the goddess. In another temple there were three parallel halls opening to the courtyard, the central one being that of the god, while another one was occupied by his consort.

The temple of Marduk (Baal), attached to the Tower of Babel, was of great size. The enclosing wall had a number of towers channelled into vertical grooves, which were as characteristic of Babylonian architecture as of early Egyptian. The chief chamber here contained a figure of the god seated on a throne. The great tower was a solid brick mass, square in places, but there was no evidence to show how the upper part had been formed.

The Germans have also excavated Assur, the oldest city of Assyria. Enormous walls, city-gates and palaces were explored, as well as the Temple of Assur, which dated from

the ninth century B.C. The results have been published by Dr. Andrae. Here again the temple consisted of a court surrounded by a row of many chambers, combined into one enclosing wall. It was entered by a great gate, and opposite were large cells between two stepped towers or *ziggurats*.

The palace of Nebuchadnezzar (sixth century) has also been recently uncovered. It was a huge "castle" with innumerable courts, halls and chambers. The side walls of the paved way which led up to it were decorated with big and splendid figures of lions made up of coloured glazed tiles.

The chambers in the temples and palaces were all probably covered by vaults. Layard found one vaulted chamber entire in the thickness of a great wall. Arched drains and evidence for barrel-vaulted gateways have been discovered, and Loftus describes many graves covered by vaults where the thin bricks were set "on edge," and leaned back at an angle in the typical Eastern manner. Flandin and Loftus thought that there was sufficient evidence to show that the apartments of the palaces had also been vaulted. Arches frequently appear on the Assyrian slabs; on one of the slabs is represented a group of domes, some tall and conical and others rounded; they have little "lanterns" on their tops. Domes must have been indigenous by the great

rivers of the East from a very early time; according to Miss Lowthian Bell, the houses of the modern mud-built villages of north Syria and northern Mesopotamia are covered with conical dome-like roofs like those shown on the Assyrian slab; see also the remarks of Perrot and Chipiez and Choisy on this subject. The church at Bosra, built in 512, has a tall dome of a semi-elliptical form; if it is of the same age as the church it is an interesting

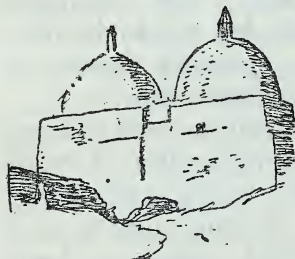


FIG. 14.

link in the tradition of dome-building in western Asia. Fig. 14 is from Sarre and Herzfeld's recent volume on Mesopotamia.

The lower part of palace walls were covered by the large sculptured slabs of

alabaster, a fine collection of which are housed at the British Museum. Layard says that they were painted in colours, and many traces of this are still to be seen on them.

To Mesopotamia we probably owe the development of cities, great irrigation schemes, ordered gardens, water supply, the use of lead and asphalt, drainage and fortress-building. Bricks may have been made here earlier than in Egypt; here the arch may have been invented. The vault seems first to have

been systematically used in the monumental structures of Mesopotamia, and here the dome became prominent.

At Susa an early temple has been found by De Morgan, built of burnt brick and enamelled tiles. According to Strzygowski, the original home of burnt brick vaulted construction and of the method of balancing big vaults by smaller ones, was Mesopotamia. The casing of important external parts of buildings with enamelled bricks forming figures, was a striking feature; it culminated in the magnificent frieze of archers now at the Louvre. In Egypt, as we have seen, coloured faience was used internally. Fine works of sculpture have been discovered which date from about 3000 B.C.

On the Assyrian slabs columns are represented standing on cushion-like bases. Either these are the originals of the Ionic base or vice versa. Other bases are sculptured sphinxes or lions. Possibly by the mediation of Roman architecture this was the source for the beasts carrying columns at the porches of Romanesque Italian churches.

In the later art of western Asia, Greek influence strong and constant may be detected. The columns at Persepolis are modifications of the Greek Ionic order, the tomb of Cyrus is almost pure Greek work, and the influence of later Hellenistic art spread over

all the Orient. At an earlier time the Assyrian art of the eight and ninth centuries shows many resemblances to archaic Greek and Ægean art. Small columnar erections of Greek fashion are shown on the slabs at the British Museum. Even the slabs themselves probably had a Cretan source, as will appear below. Again, the rosette decoration, so common in Assyrian decoration, is the typical Ægean ornament. These rosettes seem to have been a decorators' memory of the ends of round timbers which were built into the walls as bond.

A third early civilization arose on the northern shores of the Mediterranean, and in the islands of the Ægean. Its chief centre in the second millennium B.C. was Crete. The pottery and other remnants indicate an age going back to the time of the early Egyptian dynasties. Then, as later, there was communication between the Egyptians and the people of the Ægean who produced the first European architecture.

About a century since, drawings made known in the west some remarkable monuments at Mycenæ, which it was seen must be those which Greek authors had described as belonging to the heroic age. One was a gateway of huge stones in a city wall. Above the lintel of the gateway a triangular void had been left to relieve it of the weight and the

space was filled by a sculptured slab. This was the Lion Gate of Mycenæ. Another famous monument was a large circular tomb-chamber, roofed in beehive form by gathering the courses of the masonry inwards like a tall dome set on the ground; the exterior was buried in a mound of earth; a passage to the door of the chamber was formed in the outer part of the mound, walled on each side, like an inlet in the side of a railway embankment. On each side of this door, which again had a triangular relieving space above it, were highly-decorated shafts, of which many fragments were found. The largest pieces were brought away and, after having been forgotten in an Irish garden, they were re-discovered and given to the British Museum, where a restoration of the gateway is now set up. The decoration is of very refined workmanship, consisting of spirals, some of which have circular sunk centres which were made by a tubular drill.

At Tiryns a beautiful frieze-like band of similar work still, when discovered, retained blue glass inlays in such sinkings. It was soon seen that this blue glass must be the cyanus of Homer. The interior of the dome, which was nearly fifty feet in diameter, was covered at intervals with holes, and some large bronze pins were found which show that it must have been studded with rosettes or stars,

doubtless of gilt bronze. The general idea thus resembles in some degree the sprinkling of stars over an Egyptian ceiling, but the lavish use of bronze, here and elsewhere in art of this type, was a new gift to architecture of which the classical Greeks made great use. At Orchomenos a part of a beautiful ceiling wrought all over with spiral patterns on alabaster slabs was found in a similar tomb.

Comparison with Egypt and other methods of inquiry led to assigning an era to this art which we may best remember as following on the year 1500 B.C. Dr. Schliemann discovered works of a similar type, and others still earlier, in the citadel of Troy.

Greek legend seemed to point to Crete as being an important centre in the pre-Homeric age. In 1900 Sir Arthur Evans bought land on the site of Knossos, where he soon excavated a great complex of buildings which has proved to be a vast palace—almost certainly the “Labyrinth of Minos.” Here were halls with columns of wood larger above than below (a quite reasonable thing in framed construction, like the “legs” of a modern table), a portico with a double row of six pillars, wide stairs rising in many flights, and bathrooms. The chambers had plastered walls painted with scenes or ornament, and sometimes modelled in low relief before painting, and many of the walls had

dadoes of gypsum (alabaster) slabs. Evidence was found for windows. There was walling of fine masonry and of rubble set in clay, also of crude bricks, and some burnt brick has been found. The floors were paved or covered with hard plaster. (That of a hall at Tiryns was painted with fish on a blue ground.) The streets were paved and had built drains, and socketed pipes for drainage or water supply have also been found. Pottery, ivory carvings and gold-work were all very beautiful.

One characteristic of this Ægean architecture was the use of casing-slabs of alabaster or stone as dadoes to walls built of inferior materials. These slabs were frequently put against the wall alternating with a thicker stone rebated so as to cover the joints of two adjoining slabs, a method of construction which was taken over into the Doric frieze. The beautiful band found at Tiryns, usually called the frieze, was of this type, and probably it was a dado. At Knossos, Sir A. Evans uncovered the base of a wall which had thick slabs on both sides linked together through the wall by short timbers dovetailed into the slabs. The fine fragments of slabs sculptured with oxen in the British Museum have similar indentations for fixing, and these too were probably part of a dado. Thin slabs of marble were also used for casing, and even at

this early time some of the painted decoration imitated marble slabs.

Round tombs like that at Mycenæ have also been found in Crete. These beehive domes closely resemble, as has been mentioned, the chambers in the Egyptian pyramids of the Twelfth Dynasty, and very much in the art witnesses to the closest contact with Egypt. While this Ægean art gathered from, and perhaps gave to, Egypt, it passed on its ideals to the north and west of Europe, where the productions of the bronze age clearly show its influence.

A recent visit to the chambered mounds of Brittany, which have their great stones crudely ornamented with spirals, has convinced me that they belong to the same cycle; and if they, then also our own dolmens, and New Grange in Ireland. Stonehenge, which is built of wrought stones, having the uprights tenoned into the lintels, has in it something of style; it is not savage. On this line of thought we might date it nearer 1000 than 2000 B.C. When, about twelve years ago, one of the great lintel stones fell, it was easy to see on the newly exposed surface, which had rested on the upright stones, that the shape had been obtained by bruising off the excess of material, leaving a pitted surface. The first wave of civilized art in Europe flowed from the Ægean.

The permanent gifts of this art to the repertoire of universal architecture appear to have been important. The following may be suggested: the moulded capital (the germ of the Doric order), attached ornamentation of bronze, the staircase with returning flights, slab wall-linings, the architrave doorway, rosette and meander decoration, and naturalism in ornamentation—in Egypt the wonderfully natural birds and beasts were not so much ornament as an attempt to make in the tombs substitutes of the living creatures.

CHAPTER VI

BUILDING ART IN GREECE—THE EFFORT AFTER PERFECTION

WE have seen that in the islands of the Ægean and in what became the Greek lands around its shore there early flourished the first European style of Architecture. This type of art has been found in Asia Minor and in Italy, as well as at Mycenæ, Sparta, Athens itself, and many another Greek site. This is the art of the heroic age with which the Homeric poems deal; it is the background of Greek art proper. About 1300 B.C. there were great upheavals and invasions which almost entirely subverted the Ægean civilization, so much so that except for remains of pottery there still exists hardly any *direct* link between Ægean and Greek art. Indeed, we are not sure as yet whether the Ægean art was merely an underlying stratum which influenced Greek art, or whether it is to be considered as a first phase of Greek art itself. But it is clear that, whatever change of population and rulers there may have been,

Greek art is rather the resumption of the old traditions than a new departure.

If it be asked whether there is any evidence for continuity other than likeness, the answer must be yes. In the Homeric poems this parent art is described with great fidelity, and to the Greeks of the early historic period it was evidently a very real ideal. Again, Homer's ideals are in much the ideals of mature Greek art. Stonework was to be polished, and much bronze, gold, and ivory were to be used. Shining, glistening, well jointed, are the favourite epithets.

Many of the early monuments remained in later days. Thus the great beehive tomb of Orchomenos was perfect in the time of Pausanias, who speaks of it as the most wonderful building in Greece. In remote districts Ægean types long persisted. Thus in Phrygia several roughly sculptured pairs of affronted lions have been found which evidently follow the same tradition as the Lion Gate at Mycenæ, but they must be relatively of late date. Again, on the Phaistos Disc appears a symbol that is a picture of a little wooden building such as might be drawn from the fourth-century Lycian tomb in the British Museum, which represents a wooden, ark-like structure that itself was evidently copied from the type of primitive buildings well known in the country.

When Greece entered on her period of high-strung life the time of first invention in the arts was over—the heroes of Craft, like Tubal Cain and Dædalus, necessarily belong to the infancy of culture. The phenomenon of Egypt could not occur again; the mission of Greece was rather to settle down to a task of gathering, interpreting and bringing to perfection Egypt's gifts. The arts of civilization were never developed in water-tight compartments, as is shown by the uniformity of custom all over the modern world. Further, if any new nation enters into the circle of culture it seems that, like Japan, it must “borrow the capital.” The art of Greece could hardly have been more self-originated than is the science of Japan. Ideas of the temple and of the fortified town must have spread from the East, the square-roomed house, columnar orders, fine masonry, were all Egyptian, as were many methods of workmanship and ideals of proportion. Besides this external source in a living higher culture, the Greeks found on their own soil the splendid monuments of the heroic age. Not only is this true of architecture, but Greek coins and gems show close study of primitive prototypes. Even after the Dorian invasion the craftsmen would have continued to belong to the old races. If blood is thicker than water, the land is thicker than blood. There was yet a third

element which was contributed by the traditions brought in by the invasions which overturned the Ægean civilization: a barbaric strain which was only controlled and transcended a few generations before the age of perfection. About the tenth century B.C. the arts of Greece began to emerge, in the fifth they blossomed, and by the end of the millennium the impulse seems to have been exhausted. One of the marvels of Greek art history is the rapidity of the movement through maturity. Its progress was like a comet's at the perihelion. After centuries of artistic rudeness there was a couple of generations of intense training, then attainment by another generation, and the beginning of decay at once followed. The barbaric element gave vigour—a hard, gem-like quality which is so marked in all phases of the art. It has been well said that no art can be classic which has not been barbaric. The movement of every great school of art seems to be through a regular curve.

Many important sculptured works of Doric architecture erected about 600 B.C. have been made known to us by excavation. The older Parthenon at Athens, with its sculptured pediment, the temple at Assos in Asia Minor, the temple at Selinus in Sicily, with sculptural metopes, and the temple recently discovered at Corcyra in Corfu, are the most

remarkable examples. The last was a large structure about 150 feet long by 65 feet broad. The Pediment group was extremely rude, the principal features being a huge Gorgon in the middle supported by crouching lions on either hand. Still earlier works have been found at Olympia, Sparta, Thermon, and other sites. At first the temples were built of crude brick strengthened by timbering; the columns were of wood, and the walls had a stone basis to lift them above the ground. This method of crude brick construction, it must be remembered, persisted right through antiquity, and into modern times for secondary purposes, that is, for the great bulk of building work. Some at least of these early temples had sloping roofs covered with tiles; others had the Egyptian and Ægean roof of close-set timbering supporting a thick bed of clay. It has been suggested by Prof. Ridgeway that the "span roof," which gave pediments to the Greek temple, was brought in by the northern tribes. He quotes Pindar as saying that the Corinthians were the first to put gables to their temples. Both types of roof seem to be mentioned in Homer. A building with a span roof is shown on the Phaistos Disc, this is probably the earliest evidence for it which exists.

As long ago as 1884 Dörpfeld showed the close connection between the Doric temples

and the structures of Ægean times. In later temple construction the base course of the walls is made double the height of the other courses. This plinth is derived from the stone basis under the crude brick walls. Behind a Greek portico the side walls of the cella project and are finished with pilaster-like members called *antæ*. The peculiarity of the Greek anta is that its return on the flanks is very narrow as compared to its width in front. This was a memory of the plank-like timbers which anciently formed the termination of the mud-brick walls. The external colonnade of columns, which is such a magnificent and characteristic feature of the Greek temple, seems to have originated in a sort of verandah added around the cella of primitive temples to protect its walls. Evidence was found at Olympia which showed that the peristyle and the beam above had been of wood. When we consider types of planning we again find that the Greeks closely followed Ægean precedent. At Troy, Tiryns and Knossos halls with columns have been found from which the temple plan was easily developed. The simplest form of columnar hall is that in which the space is divided in two by a central row of columns. It is uncertain whether a building of this type at Troy was a hall or a temple. The recently excavated primitive temple at Sparta had such a row of

wooden columns down the centre corresponding to wooden uprights which strengthened the crude brick walls. At Thermon an archaic Doric temple has been excavated which was also of wood and crude brick built in this form. The great temple at Pæstum, which used to be called the Basilica, is the best-known example of this type. Here the longitudinal division is very striking because a second row of columns was superimposed on the lower story. Early Ionic temples with central rows of columns have been found at Neandria in Asia Minor and at Locri in southern Italy. The latter plainly showed that the external peristyle was a later addition around the cella. The Propylæum, a roofed porch with pillars in front, is of Ægean and Egyptian origin.

As has been said, the circular plan of the Mycenæan tombs was probably not an isolated phenomenon. The circular hut must have been built for many humbler purposes. In the shrines over the sacred vestal fires of the Latins the tradition of the hut with the hearth in the midst was continued. An early Tholos has recently been excavated at Delphi. It was about twenty-two feet in diameter and was surrounded by a ring of thirteen Doric columns only about eight feet high. It seems to have been built in the sixth century. The Skias, which was erected about the same time

at Sparta, by Theodorus of Samos, must have been of the same form. The tradition was continued in the fourth century in the beautiful Tholos at Epidaurus, of which large remains have been discovered.

Mature Greek architecture had two modes—the Doric and the Ionic, names which correspond to native and colonial, or to old and new. The typical plan of a Doric temple with a cella having a portico of two columns between antæ is derived from architecture of the Ægean age. The Doric capital was obviously developed from the same parent style, as may be seen by examining the capital from Mycenæ in the British Museum. The curious Doric frieze of metopes and triglyphs follows the ancient type of slab and bondstone construction used for dadoes, the cornice is an eaves-course of projecting rafter-ends copied into stone.

In the rich colonies of Asia Minor a companion type of building to the Doric sprang up in the Ionian style. It was more slender and elegant than the masculine Doric order. Its principal characteristic was a capital which was not cut from a square block, but from a block longer one way than the other, the ends being carved into spirals. The column was also planted on a base, and did not rise directly from the pavement as did the Doric. This base, in origin, was a stone block set under

a wooden post. The Ionic cornice with its dentils is a translation into stone of the overhanging part of a flat roof; in some early examples the dentils are rounded and close together, representing the ends of the poles which supported the flat terrace roof; in this form it goes back to Ægean time and to Egypt. Until a late time the Ionic entablature had no frieze, but the cornice rested directly on the architrave. This was the case even in the fourth-century temple of Ephesus and at the Mausoleum. The British Museum restoration of the order of the later monument is wrong in giving a frieze to the entablature. The Ionic capital, as has been conclusively shown, is an adaptation of the Egyptian Papyrus capital. As a feature of wooden architecture it may go back to the Ægean period, but it does not seem to have been brought into stone temple architecture until the sixth century. The Ionic column was frequently used as an isolated support to a griffin, a statue, or some other object. It was set up also as a goal post (see the paintings on the Clazomene sarcophagus in the British Museum). The high piled-up base, usually consisting of three spreading courses, suggests that it was developed as the foundation of a free standing pillar. The three fasciæ of the Ionic architrave, the fluting and reeding of columns, and the door architrave set with

rosettes, are all Ægean and most of them are Egyptian. Vitruvius says that the temple built by the architect Chersiphron, about the middle of the sixth century B.C., was the first in which the Ionic order was adopted, and nothing has been discovered which certainly conflicts with this statement, although an early Ionic temple at Naucratis has sometimes been thought to be earlier. Large fragments from the Ephesus temple are in the British Museum, and a full and interesting account of it has recently been published. The restoration set forth in this work is not altogether satisfactory—for instance, a fragment of a member with an enormous egg and tongue moulding about sixteen inches deep, now in the Museum basement, has traces of a volute at one end which shows that it was the anta capital, but it does not appear in the restoration; it is a pity that such valuable fragments should be inaccessible. Another valuable Ionic fragment in the British Museum is the upper drum of a column from Halicarnassus, which is decorated with a band of palmette ornamentation. This, compared with the order of the Erechtheum, the early column from Naucratis, and another early column found at Locri, shows that this characteristic was well known from an early time.

A Greek temple, Doric or Ionic, had one stately chamber (the cella) which was usually

surrounded on the outside by a row, or two rows, of pillars forming a continuous colonnade (the peristyle), the simple roof slanted back from the cornice over the side pillars forming low pitched gables at the ends (the pediments), in which were arranged magnificent groups of sculpture. The materials and workmanship were often of the fairest and most perfect kinds, the walls and columns were of marble, the blocks of which were wrought so level that they seem to adhere by contact. No cement was used, but the stones were linked together by metal cramps. The stones were worked flat and square by means of being tested against a plane surface smeared with paint, the "red canon" of Euripides. The roof was laid with marble "tiles" cut thin, having raised edges and covering pieces. On the points of the gables were acroteria. The accessories of the sculptures, such as shields and spears, were of gilt bronze, the doors of the same material or of wood inlaid with ivory. The dazzling surface of the marble was softened and adorned with delicate pattern-works in bright paint. The altar of the temple was outside the eastern door, the cella was the dwelling of the god by this altar, around was a sacred precinct containing many smaller buildings, statues and trees.

Greek architecture at the summit of its

course is represented by the Parthenon at Athens, erected from *c.* 447 to 435. It is a large Doric work built of fine marble, fitted together with such extreme accuracy that the joints are hardly visible. A peristyle surrounds the exterior, and there are additional columns forming deep porticoes at the ends. The famous frieze, representing a festival procession of horsemen and others to the temple itself, was a band along the top of the cella wall all around under the shelter of the peristyle. The ceiling of the space between the cella and the outer columns was of marble slabs cut into coffers and painted in bright colours. The roof was of marble tiles. The metopes of the frieze above the columns were sculptured with two or three figures in high relief on each panel. The subjects of these metopes were the battles of the gods and giants, the legendary battles of the Greek and Centaurs, and the war of Troy, making up a sort of stone Book of Genesis. The pediments were filled with great compositions of many figures, one end showing the birth of the goddess Athene, the special protector of the city, and the other the story of how she first took the city under her own protection. In the first she and her father Zeus appeared in the middle of a group of the gods; to the left Dionysos and an exquisite group of a mother and daughter — Demeter and Persephone.

To the right are seated the famous three, usually called the Fates, by general consent the most beautiful group of sculpture in the world. One of the figures, the most perfect of all, is so luxuriously exquisite, and reposes so languidly, that some foreign critics have come to think that she must be Aphrodite. Drill holes on her arm and neck show that she was richly adorned with a necklace and bracelets; this and the soft raiment would seem to confirm the view; moreover, the figure corresponds closely to a reclining goddess sculptured in relief on the frieze which is known to be Aphrodite. In the interior of the cella there were rows of columns on either side supporting the roof, and in the farther half of the central space rose a colossal figure of Athene herself. This amazing statue, the masterwork of Phidias, was formed of casings of gold and ivory over a wooden core; sparkling precious stones were set as eyes into the ivory face, and tresses of wrought gold fell on the shoulders from under a superb helmet. The goddess stood with her left hand on the edge of her round shield, carrying on her extended right hand a winged figure of Victory. She was the protector of the city who bestowed victory on the Athenians. No light entered the temple save from the great door opposite the figure, which must have been brightly illuminated by many lamps

suspended about it. With its blazing eyes, delicate curls of hair, ivory flesh, shining raiment and added adornment of jewellery and painted details, it went far beyond what we conceive as sculpture: it must have seemed a "double" of the goddess herself, really dwelling in her temple. A sight of Athene must have been a tremendous experience. Even to the modern Renan a visit to the Acropolis seemed like a revelation of the divine: "The whole world seemed barbaric, the Orient shocked me by its ostentatious pomp and its impostures, while the majesty of the best Roman seemed only a pose compared to the ease and simple nobility of the citizen who could comprehend what made the beauty of the Parthenon."

In the great period of the fifth century the aim after a perfect type led to standardizing arrangements and forms and endeavouring to perfect them along a very straight line. But before the fifth century there are very wide variations in even the simple Doric type. A beautiful variety of the Doric capital was popular in Sicily and southern Italy, which had a hollow throat under the echinus. One of the temples at Pæstum had a panelled soffit to the pediment cornice; one of those at Selinus had big and small cornice blocks alternately in the lateral cornices. The great temple at Agrigentum had enormous half-

columns attached to closed elevations; the scale was too big for it to be built in the ordinary form. A treasury at Olympia had columns which had beads between the flutes. Some temples had all the metopes sculptured, some only those at the ends. In planning and proportion there was constant change, but all was the change of ascending effort, it was not change to tickle tired eyes.

These are varieties of type, but in the architecture of Ionia variation of detail was allowed in the same building. In the sixth-century temple of Diana at Ephesus all the base profiles are separately designed, the shafts have different numbers of flutes, some even being narrow and wide alternately, and the Ionic capitals are varied like those in a Gothic church. Notwithstanding this freedom in workmanship, up to about the time of the completion of the Parthenon, say 430 B.C., Greek temple architecture had been a highly conservative—indeed, a sacred art. Greater perfection and intensity in the working out of a few ancient forms, rather than variety, was the artistic ideal. They aimed at perfect form, not at amusement for the eye. As Morris well said, there was a reason for everything, even though that reason might be superstition. The Parthenon marked the close of an epoch. Phidias was the Michael Angelo of the Doric dispensa-

tion. Directly after this culmination a movement set in towards capricious variation and luxuriant decoration. Ornament which before had been painted on plain mouldings was now carved. The S curve, or cyma recta, was now first introduced as a moulding in the gutter front of the Propylæa. At this time the Corinthian capital was evolved as a highly enriched form of Ionic. The usual type of tombstone (stele) had been carved at the top into a fine palmette-like composition of scrolls springing from tufts of acanthus; and the designer of the Corinthian capital applied this kind of foliage to the Ionic type of capital. It was an outcome of the general tendency towards redundant ornamentation, and further fed that tendency, so that henceforward there was a third form of column, the Corinthian, or luxurious, order. The earliest-known example, dating probably from about 420 B.C., was discovered at Bassæ, exactly a century ago. Others hardly later have been found at Epidaurus, and still others formed parts of the Philippion at Olympia, and the monument of Lyiscrates at Athens.

According to Vitruvius, the Greeks proportioned their buildings so that all the parts were related to one another; the plan might be twice as long as broad, the height of the columns would be likely to have a simple

relation to the diameter, and so on; this, as we have seen, had been an Egyptian idea, and is quite natural at an early time, although there is no reason if a column may be eight or nine diameters high, why it should not be anything between the two. The real proportions of a structure were, of course, determined by tradition, purpose, cost, situation, and materials; the rest was a slight modification superimposed afterwards—a getting rid of the half-inches, as it were.

Much time has been spent in trying to elucidate Greek proportions, for the most part time wasted. The idea of looking for such proportions has been a most disturbing factor in the study of Greek buildings, and we hardly have accurate dimensions of any one in feet and inches, because the student was set on evolving some scheme of measures in the modulus of the diameter. If it didn't fit he added on a foot or two and said it must be so. Simplicity, clearness, accuracy, repetition, the eye can estimate, but it takes no heed of the accuracy of the relation of eight to one, or the same with two inches added or taken away. It is quite an assumption that eight to one is good for a column; it depends on many things; the addition or subtraction of two inches might improve it.

It is quite different with modifications by curvature and other adjustments made by

Greek masons; here we have something tangible, if subtle. These modifications may be used to bring about unity. If, for instance, the eight columns of a portico incline towards the axis and there is some adjustment in the spacing, you do not have one factor repeated eight times, but together they make up one whole thing—a portico.

Curvature of lines again furnishes an intermediate between the straight and the rounded, between cornices, columns, and sculptures. It takes off the hardness, as we should say. It will correct any look of sagging in horizontal lines, and it varies the lighting on surfaces. Such adjustments are most natural in a highly refined school of architecture and need no explanation.

It is so usual to consider Greek architecture from the point of view of the evolution of the temple and of the orders that it may be well to give a general, if summary, account of it as building procedure even at the risk of some repetition. Early walling of crude brick or rubble was strengthened by beams and posts of wood. Fine ashlar masonry was built in Crete at least 2000 years B.C. The early type of masonry, usually called polygonal, was occasionally continued in later times, very accurately executed. The walls of the little temple at Rhamnus were of this kind, and the thick marble slabs of the pavement of the

sixth-century temple at Ephesus made quite a crazy patchwork. In fine squared ashlar the bedding and jointing were very accurate, and all such masonry was put together without any cement, but the stones were linked together by metal cramps and dowels. Later cramps are of the form of a rolled iron girder H, earlier ones resemble the letter Z if it is bent a little so that the turns are at right angles.

Walls were completely dressed down after erection, and the fluting of columns was then done. This was probably a late custom, for the walling stones of the sixth-century temple at Ephesus are slightly chamfered all round, evidently for the same purpose of preserving the edges of the blocks. Stones were frequently hollowed out at their back so as to reduce their weight. In this way ceiling beams and lacunars were considerably lightened. A cornice stone from Xanthos in the British Museum is an example. The lacunaria or masonry ceilings were formed of thick slabs, with a series of square coffers dug out of them. In the Theseum and other places the squares were pierced right through, and little covering pieces like tiles were set in rebates. At Bassæ the coffers are not square, but in various proportions of lozenges. At Priene and the Mausoleum there was only one big coffer to a columniation, and it was

reduced by a series of over-sailing margins to a panel of fair size.

If temples were not built of marble, and comparatively few were, the masonry was covered by a thin coating of very fine plaster rubbed down to a smooth face to take the painting and gilding. More than a hundred years ago Goethe observed that the temple of Agrigentum had "been covered with a thin coating which would please the eye and preserve the stone." The last clause has an importance which modern builders have forgotten. All stonework in our climate ought to be covered by paint or lime or some protecting skin, and without it it looks quite raw and makes one shiver. Plastered temples were fully coloured with washes and ornamentation. Marble temples were coloured in part and picked out with gilding—illuminated as it were. The triglyphs were usually a bright blue, also the cornice blocks above; the spaces between the latter and the bands were full red; ceiling panels were usually blue, with a gold star, and so on. The margins and mouldings had delicate little frets and honey-suckle patterns. Even the figure sculpture was brightened with gilt bronze and painting.

Greek mouldings were very few. There is the ovolo or echinus of the capital, and a similar roll or cushion which seems to be an essential part of a base. The "Egyptian cavetto"

is found in terra-cotta roof casings of an early date. The most curious moulding when seen unadorned is the "hawk's beak," but it was always painted into a series of petals; the beak part is formed by the turned-over tips of the petals. The carved egg and tongue moulding had its origin in the same idea: it represents a series of petals turned out and down. Then there is the elegant reversed cyma moulding, always painted or carved with a row of leaves, and finally the cyma recta.

The Greeks restricted themselves in the main to two types of columns, but there was much freedom in the use of them. In the Propylæa, built in the fifth century, directly after the Parthenon, both kinds were used. Only a few years ago it was thought that the caryatid supports at the Erechtheum were a freak of design, but they were in use in the sixth century, and probably had even then a history, for the farther we go back the nearer we get to a time when statues and pillars coalesce, and when the pillar was itself a sacred thing. The sixth-century caryatides found at Delphi are remarkably like those at the Erechtheum, so there is no doubt of a continuity of tradition from the sixth century onwards. A few years ago a caryatid figure was discovered at Tralles, of an early manner, although it was itself late. It was compared

by Collignon with the others of the same type, and it was seen that it must have derived from an original work of about 470 B.C. It has several divergencies from the Erechtheum type, the most striking of which is that the left arm was raised and evidently touched the architrave. On the other hand, there were many points of resemblance to the "maidens" of the Erechtheum, and it is clear that all must have followed one general tradition.

Another very curious architectural member is the acroterion, which was set on the gables, sometimes one, and sometimes three. These were not late ornamental additions, but they appear to have been essential and important features from an early age. Primitive builders seem to have made much of the point of the gable by crossing the rafters, or by setting there some animal's head. The developed form is usually much in the shape of a lyre, with two strong, horn-like branches, one on either hand, turning into scrolls and palmettes. It seems possible that they may derive from horns of consecration. Cockerell's restoration of that on the temple of Ægina is well known. The recent excavations have brought to light other fragments, and as now restored in the Munich Museum it must be six or seven feet high. Following on this a restoration has been made of the great acroteria of the Parthenon, similar compositions of open

scrolls and acanthus foliage of great size. The late Ionic temple at Magnesia had similar acroteria about seven feet high, and others have been found at Pergamon, having pierced scroll-work of quite remarkable beauty. The pairs of acroteria at the lower angles of the pediments were at times griffins or other beasts. In later times, large groups of sculpture formed the central ones. At Delos these were composed of four or five figures each. Frequently a Victory was set in this position.

Roofs were either covered with tiles—that is, large pantiles with covering rolls—or by marble copies of the same, wrought and adjusted with amazing precision. They either dripped along the eaves, or they were turned up at the bottom into a sort of low parapet (later the cymation), having at intervals jutting spouts like toy cannon, or lion's heads with open mouths. There were hip roofs at the Propylæa.

Besides the main line of development into the mature marble architecture of the fifth and sixth centuries, there must have been several collateral traditions arising out of wood and mud-brick construction. At Sparta there was a shrine plated over with bronze plates, doubtless on a wooden framework.

The use of a material not impervious to rain seems to have led to the sheltering of the

side walls by spreading the roof on to an external colonnade, originally a row of wooden posts. The walls were also plastered. A further step with this type of building was to extend the use of casings like the burnt tiles of the roof. The early temple at Thermon had its metopes of painted squares of tiles; and painted tile casings for the cornices and pediments had an enormous vogue in Greece, Sicily, and Italy. The tile-cased type of building found in Italy and usually called Etruscan is only a distant wave of the Greek impulse. A very fine example may be seen, in the terra-cotta gallery in the British Museum, of casings which were evidently nailed over timbers. The use of these terra-cottas covered with elaborate painted patterns was later taken over as an adjunct to stone architecture, and remnants of them have been found on many sites, at Olympia, at Athens, at Selinus, at Pæstum, and most recently, at Bassæ, where they evidently belonged to an earlier temple than that built in the fifth century.

The staircase in the palace of Knossos rises in five returning flights. At Selinus the temple has a spiral turret-stair. Careful drainage works were executed at Knossos with socketed pipes; and excellent inspection traps of the fourth century have been found at Priene. Ample evidence for large windows divided

by mullions has been found in Crete. There are windows of the fifth century in the Propylæa at Athens, and some delicately ornamented fragments of window architraves from the Erechtheum are in the British Museum. The Tholos at Epidaurus also had windows. A late relief at the British Museum shows a two-light window divided by a mullion. Screens of metal or lattices pierced in slabs of marble were largely used. The spaces between the columns of temples were frequently enclosed in this way. Greek doors were of wood, bronze, or stone. The wooden doors seem to have been panelled and of quite a modern type; they were studded with bronze nails and inlaid with ivory and ebony, or had panels of carved ivory and gold. The marble doors must have been delightful things; at the heel they were wrought with a globular pivot which worked accurately in a cavity. This part of a door of the fifth century has lately been found at Argos. There are some good fragments of later tomb doors in the Leeds Museum. Heavy doors were made to open over metal quadrants inlaid in the pavement; such quadrants were used in the sixth-century temple at Ephesus, at the Parthenon, and several other places. At Selinus there were double quadrants on each side. This and other indications showed that the open door had folded flat against the wall, with a little

flap to cover the ends—exactly like good modern drawing-room shutters.

I have endeavoured to show how this “incredible beauty” of Greek architecture was arrived at by continuous development from the most humble beginnings. The Greeks endeavoured to perfect a limited subject-matter and to create eternal types. This mysterious Greek architecture was but one customary way of doing buildings, after all; and recent researches have shown that in origin the forms are barbaric and accidental—accidental, that is, in the sense that with other conditions they would have been different. There is little æsthetic mystery about the mud walls and wooden props which became a cella and peristyle, or in the overhanging eaves which became a cornice. The wonderful thing is the Greek spirit, and if we would share that we should concern ourselves with perfecting stock-brick walls, chimneys, and downpipes rather than in designing pseudodipteral peristyles and Doric triglyphs—that is, as builders; as scholars, let us know all that may be known. An attempt to “design” in architecture outside need and beyond custom is like inventing a strange alphabet which does not correspond to words and meanings. It is quite easy and quite futile. Forms are nothing in themselves, they are only envelopes of the spirit of architecture.

The principal gifts of the Greek builders to architecture are in the main those of the ideal and spirit. To them we owe the civic ideal in architecture. They associated perfect sculpture with architecture. The "span roof" seems first to have been perfected by them, and they invented regular tiling of baked clay which afterwards was copied in marble. They gave us three great types of column—with the moulded capital (the Doric), of the bracket type (the Ionic), and with sculptured foliage (the Corinthian). They established regular groupings of mouldings, as in the Ionic cornice; they gave us carved mouldings decorated with palmettes, scroll-patterns, meanders, etc., and also modern types of mosaic floors and panelled doors, embodying the principle of "framing" wood together. The Greeks also turned in a lathe the legs of furniture. To them also we owe theatres, stoæ, and the most perfect types of tombs. The spiral staircase seems to have been their invention. The Greeks first freed the spirit of beauty from the hieratic; architecture was purged of terror; they aimed at what was gracious and lovely.

CHAPTER VII

HELLENISTIC AND ROMAN ARTS—ENGINEERING BUILDING

WHEN the great culmination of Greek art was overpast—that is, when the forces which had produced it began to be dissipated and doubt arose—a long lovely evening closed in over the Greek world. At this time the architects turned for satisfaction either to æsthetic design, to variety, to the picturesque, and to redundancy of ornament, setting aside the Greek mean and measure in favour of what might astound; or, on the other hand, they sought a basis for their art in science and public utility. It was at this time, as Gompertz points out, that great engineering works were undertaken in the Hellenistic world. Hippodamus, the planner of new cities, and Philo, the architect of the arsenal, were the early leaders in this movement. It has been said of the latter that “he was the apostle of the new practical utilitarianism which heralded the union between architecture and engineering so characteristic of the last centuries of Greek art.” It was on the wide

foundations laid at this time that the mighty engineering of Rome was reared. Greek religious art had restricted itself to fine stonework and to lintel construction. As Morris has said, a Greek temple was a refined Stonehenge, and a larger range of power might only be obtained by casting back to mud and brick origins or by borrowing from other countries. A great new factor in what I call the "powers" of European architecture was to be obtained by bringing in the arch and the vault.

After the conquest of Alexander a new situation was created in the world of art. His empire was largely eastern, and his new capital in Egypt—founded in 332 B.C.—had necessarily to be built according to the material conditions present in the country. It was planned on a regular scheme, having four great colonnaded streets leading away from a four-arched structure—a *tetrapylon*—at the centre. Unfortunately Alexandria has been utterly destroyed, but it may not be doubted that the major part of the building there was of brick, vaulted and domed. We have seen that such building was general in the valley of the Nile from time immemorial, and the modern houses of the Delta are still domed. They have at the top small thimble-shaped additions which, Prof. Petrie tells me, are "hoods of bricks to act as cowls,

backing to the strong winds so as to get a draught and keeping out rain." (Fig. 15.)

On the famous silver casket of Projecta in the British Museum, which, it is held, was probably made in Alexandria about A.D. 350, a large house is represented which is roofed with domes rising from a terrace, and these domes are of the same form and have similar cowls to the modern ones just described



FIG. 15.

(fig. 16). The domes represented on the Assyrian slabs, about 1000 years earlier, are again identical except that they rise higher and are of greater importance. Alexandria was built over so many water cisterns that old travellers tell us that there was a subterranean city beneath the other one. These cisterns must for the most part have been vaulted,

like the great cisterns of the fourth and later centuries at Constantinople. Prof. Baldwin Brown, some years ago, called attention to a passage in a Latin



FIG. 16.

author, written about 50 B.C., to the following effect: "Alexandria is almost entirely safe from conflagration, because the houses are put together without any floorings or timber, and are constructed with vaults, and covered over with concrete or stone slabs. . . ."

Alexandria is almost completely hollowed out below ground, and is built over cisterns communicating with the Nile." Still another proof of the use of the dome in Hellenistic times is furnished by the fact that the earliest cupola known in Europe, the remains of which exist over a bath at Pompeii, is of the tall, conical form which seems to have been traditional in the East, and Pompeii was a non-Roman city which derived its artistic impulses from Alexandria.

The perfect arch of masonry, made up of separate wedges of stone, had been known in Egypt as early as the Twenty-sixth Dynasty (sixth century), and doubtless Egypt was the centre of its distribution. At Pergamon, in Asia Minor, evidence of an early stone vault of Hellenistic time has been found. Arches have lately been discovered at the Piræus, and it seems certain that they were in general use in the Hellenistic world before they were introduced to Italy. In the Ashmolean Museum there is the model of a late Greek tomb at Cuma which has an arched doorway (*c.* 400). Even the pointed form of arch seems to have been taken over from early brick construction. Fig. 17 shows a gateway in the walls of Masada, a stronghold by the Dead Sea built by Herod.

The forms of vaults and domes furnish some indications of architectural heredity.

The early Eastern arch of brick was a tall semi-ellipse rising gradually from the walls and turning rapidly at the top. This is a much more stable form than the semicircular arch, and could, in many cases at least, be constructed without any centering. When we become accustomed to it, it is seen to be the most beautiful form of arch, for it is the most perfect and scientific. A difficulty must have arisen in translating this form into wrought stone, for every stone would have to be cut into a different form for its place in the curve. If, however, the curve is made circular the stone wedges may all be made alike. The same is true of the pointed arch (which arose as another solution of the same problem), except that a special stone or stones have to be worked for the apex.

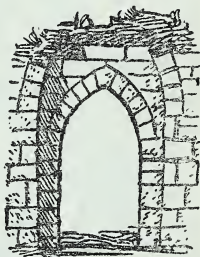


FIG. 17.

The arch form at first introduced and long used in Italy must have been the semi-circular arch of cut masonry. So it was that the semicircular became the standard form even for concrete and brick arches when a new method of construction was brought in. Roman domes were also built of this profile, and the tall egg-shaped dome of the East, which shows prominently on the exterior,

was never adopted in Rome. The dome was brought to the West as a factor of bath-building. The hot bath was built as a sort of kiln or oven, and the only domes mentioned by Vitruvius (who wrote near the beginning of the first century) are those required for the hot chambers of the baths. The ruined cupola of the bath at Pompeii, mentioned above, was a concreted shell of rubble, very conical, just the shape of modern domes in western Asia. (See Miss Jebb's *Desert Ways to Baghdad* for a group at Harran which continue to this day the form of those shown on the Assyrian monuments.)

Rising from a circular chamber, there was no difficulty in springing the bath dome from the walls, but complications arose at the angles when the dome was applied to a polygon or a square. We have seen that the Egyptians had already dealt with this problem (p. 58). At Hadrian's Villa at Tivoli there are some approximations to "pendentives." Over the octagonal chambers of the Baths of Caracalla I have seen an interesting solution made by *gradually* approximating the octagon to the circle in successive courses by making the angle more and more blunt and then rounded, and thus a kind of intersecting pendentive is formed which makes the transition easily and is, indeed, a perfect solution. At the so-called "Temple of

Minerva Medica" it looks (from below) as if the base of the dome proper were set back for some little distance over the sides of the polygon, and thus little projection is required at the angles, and the transition is slurred over in the plastering. Here the cornice was *level*, and this was probably the case at the Baths of Caracalla, too—that is, the idea of the dome with its surface running on into the angles forming continuous pendentives was not accepted and the transition was disguised. In one or two small tombs of the third or fourth century the dome with regular continuous pendentives seems to have been reached in Rome. These pendentives are the portions of a domical surface which run on continuously into the angles of a square or octagonal chamber, forming four or eight hollowed triangles.

Besides Alexandria, Ephesus (now being explored by an Austrian expedition), Pergamon and many other cities were important centres of Hellenistic art. At Seleukeia on the Tigris, built about 300 B.C., the Hellenistic architects must have come in contact with, and have absorbed, many of the structural traditions of Mesopotamia.

In the Hellenistic cities of the East civic and monumental architecture turned very soon towards the big and the strange, away from the proper classical idea of measured

perfection. The temple of Ephesus was rebuilt on an enormous scale in the middle of the fourth century B.C. It was raised on a high platform of spreading steps, and the great columns, nineteen feet in circumference, were sculptured around the bottom drums. About the same time the great tomb of Mausolus was built at Halicarnassus, which was to give the name Mausoleum to a whole class of later structures. Lucian describes it as "a tomb immense, such that never dead had a more splendid." It was about 100×80 feet in size. There was a high basement surrounded by the beautiful sculptured frieze now in the British Museum, then an Ionic colonnade surmounted above by a pyramid of steps with a great chariot group at the apex. At Pergamon the giant altar of Zeus was erected, the high sculptured basis of which, in an over-ornate style, is now at Berlin. Splendid stone theatres had been built in Greece at the end of the great period. Soon every Hellenistic city of the East had such a theatre. The amphitheatre appears to be a Hellenistic invention. The earliest-known example is at Pompeii. City colonnades, baths, and palaces were all developed in Eastern Hellenistic cities before they appeared in Rome. So also were the methods of decoration like the use of coloured marbles and the encrustation of walls with thin slabs.

The apse, which became such a favourite power in Roman architecture, must be of Eastern origin, for the half-dome must come from the land of domes. It appears to have been known to the Greeks. Michaelis says that a marble temple of the third century at Samothrace "anticipates in a singular manner, with its raised choir and rounded apse, the ground plan of the Christian basilica." A temple dating back to the sixth century has been found at Thebes of which "only the apse remained, recalling the one at Samothrace." Recently some foundations have been uncovered at Sparta of a very early age which are said to have had "rude apses," whatever that may mean.

To the Hellenistic age we also owe the large circular type of buildings like the Philippion at Olympia and the Tholos at Samothrace.

The Pharos at Alexandria, the great lighthouse built about 280 B.C., almost appears to have been the parent of all high and isolated towers. It rose to a great height, of a square form slightly battered, then there was a tall octagonal stage, and again a round one; on the apex was a statue. Even on the coast of Britain, at Dover, we had a Pharos which was in some degree an imitation of the Alexandrian one. It was a tall octagonal tower. About thirty feet of it still exist. The Pharos at Boulogne was as important

as any after that at Alexandria. The round towers of Ravenna were doubtless inspired by some of these lighthouses, even if they were not light-towers themselves. The other round towers of Europe, as far away as Ireland, derive from Ravenna. The Pharos at Alexandria was repaired by Ibn Tulun, and it had as great an effect as the prototype of Eastern minarets as it had for Western towers.

An aqueduct on arches seems to be indicated on one of the Assyrian slabs in the British Museum; from some such source, and from the great cisterns of Alexandria, into which the waters of the Nile were brought at the annual inundation, the Romans doubtless derived the idea for their wonderful system of water-supply.

Rome entered into the traditions of this Hellenistic art; in fact, Roman art was one of its branches. A few years ago it was thought that a gulf separated Greek from Roman art and the latter was said to derive in the main from the Etruscans. Now little is left to the Etruscans as originators, although they probably first adopted the Greek traditions and handed them on to the Romans. For this view see Mr. Frothingham's *Roman Cities*. Prof. Pais, an Italian writer, not only shows the debt of Rome to Greece in art, especially through the

influence of Syracuse, which had commercial stations at Ischia and elsewhere on the Italian coast, but he attributes so much to early Greek influence in other fields that there is hardly any room left for Etruscan models. In Sicily and the south of the mainland there were magnificent schools of Greek architecture in the rich colonies which had been founded at an early time, and which competed in culture with Athens itself. Pæstum, not far from Naples, had a splendid group of Greek temples such as cannot be matched anywhere in the mother-country. At Pompeii the early temple was Greek. In 1896 a temple found at Conca, near Antium, was built in the Greek form about 500 B.C. In the British Museum is a magnificent specimen of the ornamental tilework which cased the temple roof at Lanuvium not far from Rome. It is Greek in style and is obviously an offshoot of the terra-cotta casings such as have been found at Olympia, in Sicily, and in South Italy. The small and late Roman terra-cotta friezes derived from this type of decoration.

There must have been native traditions in the background and customs which modified the plans of temples and dwellings, but the ideal of architectural expression in early Italy was Grecian. The Etruscans of Central Italy imported large quantities of Greek vases from early times, so much so that the

vases, as a whole, came to be called Etruscan by those who first discovered them. A large number of fine Greek bronzes have also been found in Italy. At the same time the early dates once assigned to some examples of masonry with arches in Central Italy, and called Etruscan, have had to be withdrawn. The famous vaulted drain, the Cloaca Maxima in Rome, for instance, it has been shown, cannot be earlier than the Republican period. The arch of masonry was probably in general use in Italy from the fourth century B.C. Roman art is a form of Hellenistic art imposed on a background which was mostly of Greek origin. Observers of a generation ago remarking the conflict in mature Roman architecture between arched construction and a superficial application of columns and entablatures, supposed that the arch was indigenous, and that the orders, taken over from the Greeks, were violently imposed on a native style. Exactly the opposite of this is true. The Greek ideals, as has been shown, had long been traditional when arch, vault, and dome were brought in by the Hellenistic tide. At the time of Roman expansion the current architecture, having great demands made on it, could not throw off the old wrappings quickly enough; they were, in fact, burst by the new engineering spirit, but vestiges of the old features remained as super-

ficial adornments. This newer and truer view goes very far to relieve Roman architecture of the unfavourable criticism which has been passed upon it. It was not, that is, primarily a system of arched construction which at a later time smothered itself under borrowed bedizenments; but it was a phase of Hellenistic art, the result of a transition from the more primitive to the later type of building.

What may have been Rome's own contribution to architecture, either in forms or methods of construction, is almost impossible to determine. It must, however, be certain that from the first or second century A.D., Rome, having absorbed all that she required, distanced other competitors. In her monuments, as in her power, she became the mistress city of the world, and drew all famous artists to her service. I can here only endeavour to give some idea of the methods of Roman construction, of schemes of planning, and of processes of decoration, as we are concerned with principles rather than with individual monuments.

Sun-dried bricks had been the common building material in Rome from an early time. The bricks described by Vitruvius are of this sort. Burnt bricks did not come into general use until about the second century. They had been used by the Greeks at the

palace of Mausolus at Halicarnassus and at the Philippion at Olympia. This material was probably an importation from the East.

Stone, of course, had always been employed, both in rubble work and fair wrought masonry. In the mature Roman style wrought masonry seems to have been demanded only for the great monuments, triumphal arches, theatres, temples, and above all for the Coliseum. Even the largest domestic and civil buildings were of plastered brickwork. It may come as a shock to many that the greatest buildings of Rome, the vast *Thermæ*, the palaces of the Palatine, and even the Pantheon itself, were plastered externally. In this class of building there were usually simple stone cornices consisting of a moulded capping-course on projecting blocks, the angle one being set in diagonally; and the plastered walls were finished with sunk grooves at intervals dividing the surface into blocks. At the Pantheon one of the tiers had pilasters of very slight projection, which seem all to have been wrought in the plaster. Portions of the external surfaces of the baths were finished with mosaics, and frequently a high plinth, or external dado, was cased with marble slabs.

The most typical Roman construction was in concrete, or concreted rubble. It was either cast into a mould between timbering, or it

was aggregated more like rubble masonry. In the latter case the stones were still quite small, so that they were thoroughly drowned in the cement. To retain this fluid mass thin surfaces of stone or of brickwork were raised on each face of the walls, which were usually of great thickness. It has been said that such skins would not resist the fluid pressure of the internal concrete, but it is easy to answer that they could have been aided by backing-up gradually on the inside of the external surfaces (which would be only raised a foot or two at a time) before the rest of the wet mass was put in. The Pozzolana cement used by the Romans had a high binding power and made a perfect concrete. In the finer, earlier work of this class the surfaces of the walls, or rather their skins, were formed of little squares of stones roughly about four inches on the face, and diminishing at the back, so that they held like nails in the concrete of the mass which ran into the interspaces. These stones were set diagonally, the joints forming a network. It must have been thought that it was easier to keep the lines in this way, or that the stones settled down better. In any case there was no idea of bond, it was simply the application of a coat of mail to the concrete. When burnt brick came to be used with concrete construction, some layers of large, flat tiles—

they were about eighteen inches square—were bedded through the walls at every three or four feet. These layers not only bound the external and internal skins together, but they locked up the moisture in the concrete stage by stage. For if it were too quickly absorbed into the part already built, or dried out by the hot sun, the mass would not set properly.

When, still later, the vertical casings were also of brick it was the custom to form these in what seems at first a very curious way; but it was one which a little examination shows to have been most simple and practical. The flat bricks, or tiles, were broken diagonally into four triangles, and these were set with the long sides outwards and the points towards the centre of the wall. Thus the indented bricks adhered perfectly to the concrete, which ran into all the interstices, and there was no need for any other bond. The triangular bricks were evidently an adaptation of the pointed stones. Vaults and domes were formed as continuous shells, and were built in rubble work, in level courses finished with tiled layers, but without the skins. They were erected on boarded centrings, but as the mass brought up from the walls was homogeneous with them, and as each stratum must have been set before the next was put in, the centres did not require to be of great strength, they were rather a mould than a

support. Sometimes this centring was paved all over, as it were, with flat tiles which adhered to the finished vault. Beside the horizontal layers of brick in these vaults, roughly built strips of brick running in the opposite direction usually appear in the vault surfaces, breaking them up into compartments. They are usually too slight and too irregular to have much value *per se*, and Choisy is, I think, mistaken in regarding them as ribs. Rather, it seems likely, they were introduced as hard cores around which the concrete might set. In any case they broke up the great viscid mass, and the whole formed a sort of "armoured concrete." The great dome of the Pantheon is wholly, or largely, built of large flat bricks set in level courses. In some of the large vaults of the baths rough pottery vases—old wine-jars—are embedded. Being round they are very strong, and, building with such hollow cells, of course, lightened the structure.

At a late time, probably the third or fourth century, some vaults were formed of parallel rows of socketed drain-pipes set up end to end in the arch form. This custom is found in North Africa, and the apse vault of the ancient cathedral of Ravenna was built so in the fourth or fifth century; while the dome of San Vitale, built in the same city in the sixth century, is formed of layers of pipes

passing in continuous spirals from the base to the crown of the dome, which shows, as Rivoira has pointed out, a continuity of the Roman system. The pipes were embedded in concrete into one uniform mass.

Roman vaults and domes were banked up very much at the springing, so that they showed little to the exterior. The vaults were usually covered with additional tiled roofing. Our first idea of the dome is likely to be that it was invented as a magnificent architectural feature for the sake of external dignity, and that it was constructed as a hollow half-globe of fitted masonry. This was not the case. Such domes as have been built of masonry are but playthings. The great domes were shells of concrete or brick, covered outside by a sheeting of copper or lead, or they were plastered over, or protected by an additional tiled roof. The dome during the Roman age seems hardly to have been thought of as a form appearing externally. It had originated in mud coverings to granaries, and such humble structures; and when it was found convenient to construct it over large circular buildings only the internal hollow was considered. The outside was banked up with abutment to resist spreading to such a degree that only a flat segment of the dome showed even at the Pantheon, and not that in any near view. The construction

of higher cupolas which should dominate the exteriors of buildings was developed in Byzantine and Eastern schools, and then taken over into the Renaissance. The Roman builders were great and daring constructors, who applied vaulting under all sorts of conditions in a perfectly free way. One of the most curious applications was the use of big conches, or half-domes, over external hemicycles. The builders supported vaults above colonnades and bent them around circular ambulatories; they inclined them at an angle, and interpenetrated two vaults at right angles, forming thus the groined vault—a form that appeared as early as c. 75 B.C. in the Tabularium in Rome. Domes and conches

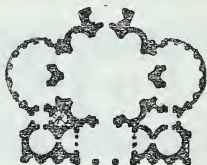


FIG. 18.

were hollowed into gores forming vaults of a melon shape; others sprang in quadrant conoids from the four corners of a chamber something like the general form of the late English fan-vaulting.

Timber-work was highly developed in roof trusses of wide span, and the military bridge represented on the Trajan Column had big laminated arched-beams. The principle of trussing seems to have been a Roman invention.

In their ambitious and complicated struc-

tures the Roman architects seem to have exhausted all the resources of the art of planning. It became absolutely emancipated from precedent, and was pursued as research into the possibilities of form and combination. The most accomplished modern French masters of arrangement can do no more than recombine Roman elements. All sorts of types were explored as well for the single cells as for complex aggregations. Squares, oblongs, crosses, circles, ellipses, polygons, sigmas, hemicycles and foiled forms were taken

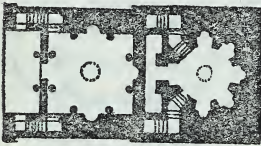


FIG. 19.

as bases; they were modified by annexes, recesses, niches, apses. These elements were then co-ordinated axially, bi-laterally, and radiating from a centre. Fig. 18 is the plan of a building in Rome known as the Temple of Minerva Medica; Fig. 19 shows two tombs.

All kinds of expedients were adopted for continuing vistas, suggesting symmetry and masking irregularities, both in single buildings and in the laying out of cities. An admirable example of this power is shown in the laying out of the great colonnaded street of the city of Gerash. The conditions of the problem necessitated a decided change of angle in its course. At the elbow a vast circular place was constructed around which

the colonnade was continued in a circle, thus gaining an additional beauty while veiling the deflection. The architectural display in the imperial fora in Rome is too magnificent and complicated to suggest by descriptions. The best view of this wonderful subject will be gained by a study of Lanciani's restored plan of Ancient Rome, *Forma Urbis Romae*.

Along with their ability to organize groups of complicated structures the Roman planners had the power of rising to a great simplicity.

The Pantheon and the Basilica of Constantine are the greatest single cells ever erected. The Pantheon, built by Hadrian, is a superb domed rotunda about 140 feet in diameter and as high.

It is surrounded by a wall mass 20 feet in thickness in which a series of square and apsidal recesses are, as it were, excavated, thus considerably increasing the total diameter. Light is only admitted by an opening 30 feet across at the zenith of the dome into this immense reservoir of air, through which the broad shaft of sunlight pours and the rain falls upon the porphyry and marble of the floor (fig. 20). The walls are encrusted with fine marbles. It is the last word in the development from the primitive

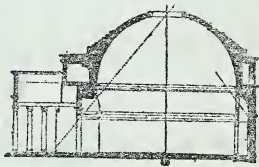


FIG. 20.

hut into which light entered by the same opening from which the smoke escaped. Probably at the Pantheon also there was an altar of incense at the centre from which a wavering column of smoke arose.

The Basilica of Constantine is a mighty hall of three vaulted bays. It is possible to group three units together without mere repetition, for there is a central bay with two lateral supports. The high vault is borne by very large piers, the spaces between which are open to the central area like aisles to a nave. Above the aisle vaults these dividing piers are continued up as buttresses sloping towards the main space. It is 266 feet long and 192 feet wide exclusive of apses. The central span is 82 feet wide, and the vault rose to a height of 114 feet. The vault was coffered, and the floor was largely of red and green porphyry. The ruin is a tremendous thing. With this great monument, built early in the fourth century, must be mentioned the vast vaulted hall of the Palatine palace, and many vaulted temples like the temple of Venus and Rome. The vaulted halls of the baths are better known. With the buttresses spoken of above may be mentioned a series of far-projecting buttresses which support the high terrace in front of Santa Costanza, Rome.

Roman methods of decoration and surface finish were as frank, and yet splendid, as their

methods of construction. Casings of marble were much used either in large slabs arranged in panels, or in *opus sectile*, where morsels of coloured material are cut to shapes and fitted together in patterns. There were also mosaics of marble and glass. Gold mosaic had already been introduced into late Roman art. Evelyn describes the grotto of the Sybil which he saw near Baiæ as "about ten paces long; the side walls and roof retain still the golden mosaic, though now exceedingly decayed by time." Bronze was largely used. The roof trusses of the portico of the Pantheon were bronze, as well as its great doors, and the exterior of the dome was covered with gilt bronze plates. Ornamental plastering was brought to an exquisite delicacy of over-refinement. Wall-paintings of the brightest colours were executed with the most dexterous skill in a medium that has never been surpassed for this purpose. But neither the sculpture nor the painting were inspired by any high meaning; they weary one as mere routine decoration. All that we owe to the Romans in architecture may hardly be recounted. They absorbed all the traditions of antiquity and renewed them into modern shape. Their ideal of construction was the most perfect and generally applicable that may be imagined. A typical Roman building was of one piece, an artificial mono-

lith; walls, vaults, floors, are all aggregated together in the same continuous material, whether it contained one or many cells. This is the method of Nature, and it is an idea which modern architects would do well to consider. The great architectural question of to-day is how to build common damp-proof walls; simple, solid floors; and, above all, roofs better than the thin slate lids we are accustomed to. We need neither Greek nor Gothic, but an efficient method, and all our preoccupations about "styles" block the way not only to high utility but to high expression. Much may be gathered from the experience of Roman builders: methods of vaulting in concrete, of building with pots and pipes, the lining of walls with hollow tiles, and even such humble devices as the use of crushed brick in mortar. Vitruvius, the vague theorist on æsthetics, gives many valuable hints for the modern builder, as when he tells us that plastering may be made to adhere to brickwork which is first coated over with limewash.

In Roman architecture the engineering element is paramount. It was this which broke the moulds of tradition and recast construction into modern form, and made it free once more. It is worthy of note that most of the famous Roman architects were engineers, even military engineers. Vitruvius,

who was keeper of war engines, says that to design them fell within the province of an architect. Trajan's favourite architect built the great military bridge over the Danube. In Rome architects were called *machinatores*, *structores*, and *magistri*. "Architect" was a more general term which included workmen. We have to learn from Rome to re-identify the architect and the engineer.

With all this mechanical perfection it must be confessed that there remains in the architectural expression of Roman works something which is not truly fine. They stand for force, expansion, splendour, the art was official, self-satisfied, oppressive. It gives a voice to matter as Greece had expressed mind. Rome was lacking in the things of the spirit. There is little wonder—the first early wonder at mysteries—left in Roman art; the dew of the morning is dried up; it is the great Philistine style. The architecture as ever mirrors the soul of the nation.

CHAPTER VIII

EARLY CHRISTIAN AND BYZANTINE SCHOOLS— A NEW DEPARTURE

CHRISTIAN thought must have criticized current classical art long before any edifices arose which can be called Christian architecture. At first the art customs would be modified by way of simplification, and by change of spirit, and only slowly would a new *corpus* of secondary forms and a fresh alphabet of ornamentation arise. In the British Museum is an interesting sarcophagus of the early fourth century, on which is sculptured the story of Cupid and Psyche. It has been counted with the late Roman antiquities, but it is more probably early Christian. The silver casket of Projecta before mentioned has only a few minor marks of Christian association.

The Christians first met together in houses and burial chapels; and special buildings for assembly were probably built in the East during the second century, certainly early in the third century. The origin of the church plan has been endlessly discussed.

Some, like one of the latest writers, Professor Lemaire, would derive it entirely from the atrium and reception-hall of the Roman house. Some would see other elements taken over from the temple and the synagogue. The most typical early church plan consisted of a forecourt, a nave with pillars, and an apse. This is the basilican plan. A Roman basilica, or justice-hall, approximated to this form, and the word Basilica



FIG. 21.

seems to have had a general meaning much like our word Hall. The civil basilica was anciently the public portico where the chief magistrates administered justice. It was afterwards enclosed like a temple, and adapted to various uses. One custom which is certainly derived from temple architecture is that of orientation, or planning the building on an east-to-west axis. In the isle of Samothrace a temple has been found which some writers have called "the real prototype of the Christian basilica." Rectangular in plan, it had a portico with an atrium in front only, and one principal façade. The interior had three aisles, and it was closed at the end by a regular apse, or semicircular niche. The small temple at Baalbec had a raised "choir" above a crypt. Again, the early synagogues

of Palestine were divided into aisles by ranges of columns. A second type of church was planned around a central point in a circle, octagon, or cross, and derived from tombs. A third, the *cella trichora*, probably originated in burial chapels. These had simple naves, and a cluster of three apses at the end. The same form is found in chambers in the palace of Diocletian at Spalato; and a mosaic pavement of the same shape was

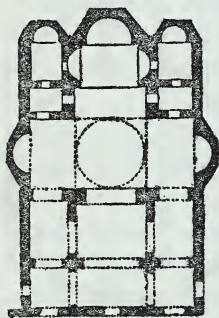


FIG. 22.

excavated in England at Ramsbury many years ago. Plans of three different types of churches are given in Figs. 21, 22 and 23. Fig. 21 is from the foundation of a basilican church discovered at Gerash in Syria; Fig. 22 is a cruciform Byzantine church from Gortyna, Crete; and Fig. 23 is from a round

church at Antepellius in Asia Minor, from a MS. drawing by Texier. All may be of the fourth to sixth century.

In the fourth century, after the Peace of the Church, Christian edifices were built all over the Empire. The foundations of a small basilican church were not long ago excavated at Silchester, near Reading. In Rome several churches, the chief of which was St. Peter's, were built during the reign of Constantine,

who erected others at holy sites in Palestine. The most perfect existing early Christian church is that of the Holy Nativity at Bethlehem, built in the year 327 A.D. This is a noble and impressive building, which stands over a natural cave, later transformed into a crypt. The nave has four rows of marble columns, supporting level lintels, and the transepts, as well as the east end, have apses; that is, it follows the burial-chapel type in this particular. The roofs are of wood. The exterior is of masonry, severely plain and austere. The interior was from the first adorned with marble casings, mosaics, and gilding. In the sixth century a mosaic of the Nativity was applied to the west front, above the narthex.

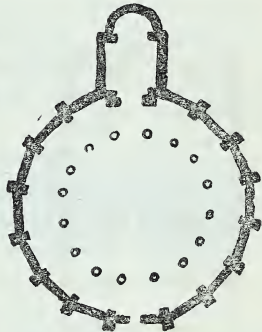


FIG. 23.

As structure, all is direct and simple: as architectural expression, it is serious and sweet. There is nothing in it which is unlike late Roman art except the total expression itself. It is the Roman alphabet in a Christian sentence, it is modern and universal.

Of the circular type the most perfect example is Santa Costanza, Rome, built *c.* 354. Above a ring of Ionic columns, set

in pairs, rises a central part covered by a dome; this and the vault of the circular aisle were encrusted with mosaics, some of which remain. The walls were sheeted over with thin marble and porphyry, and the drum of the dome was covered with elaborate devices in *opus sectile*, which at this time was a favourite method of decoration. The exterior of rough brick was plastered; even the cornice was plastered except the blocks (dentils), which were of stone. The dome was protected by a tiled roof.

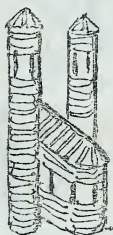


FIG. 24.

The church tower may be traced back to the early Christian age, as R. De Fleury has shown. In the Victoria and Albert Museum there are some ivory tablets from the Werden Casket, which was carved

about 400 A.D. On it appears a church, as a symbol of Jerusalem, and this church has two high round towers attached to it; the whole looks like a Romanesque church of the twelfth century (fig. 24). There is a somewhat similar representation on a panel of the beautiful doors of Santa Sabina, Rome, carved about 500.

A great number of ruined churches of the fourth, fifth, and sixth centuries exist in Syria and Asia Minor. In these a return to consider again the first needs of construction is

very marked. All redundance has disappeared, and yet all is workmanlike and fit. The fronts of some of the houses associated with these churches are made up of a series of square monolith posts to every floor linked by big square beams, all of stone. Notwithstanding the great refusal of ornament the result is civilized, clear, and in a way elegant.

In the East, under the sun of Syria and Egypt, "detail" had been changing, even in late classical days. At Baalbec and Palmyra there was a tendency for the customary modelled carving to

be translated into two planes, so that foliage on one general surface was sharply defined on a dark



FIG. 25.

background. In time this sort of carving became a continuous fretwork, undercut and relieved from the ground except for some attachments here and there. At Bethlehem the Corinthian capitals of the interior are very much simplified from their classical prototypes; they are rather shaped blocks of stone with added carving than sculptures of modelled foliage in high relief. Fig. 25 shows carving of this type from a church in Asia Minor.

In the late Roman or Hellenistic buildings

of the East many characteristics are found which later became general in Byzantine and Romanesque architecture. Arches sprang directly from columns without the intervention of an entablature. Or the entablature was bent over an arch and thus formed the germ of all deeply moulded arches. Windows had arched heads, the "horizontal arch" and joggled lintel are known, and the bracket, or console, was frequently used. All or most of these features are found in the vast palace which Diocletian built at Spalato. Here is also a long wall-arcade of small scale and a carved roll-moulding around a door. These new and usually simplified methods were adopted by early Christian builders.

Soon a further change became apparent which was to transform early Christian into Byzantine art. This name was taken from Byzantium, or Constantinople, the capital of the Eastern Empire from 330, and in the sixth century the vital centre of the arts. The simplest mark of the Byzantine style is to be found in the substitution of the domed and vaulted church for the wood-roofed basilica. This change probably had its origin in Christian Egypt, where domical roofing seems to have been indigenous, and where from time to time it would be applied to new purposes. Of late years it has become more and more apparent that much of early Chris-

tian art, iconography, symbol and decoration must have come out of Egypt.

In recent times a large number of carved fragments of Christian churches have been found in Egypt, including many capitals. These so resemble the beautiful marble capitals which are found in Santa Sophia and other great Byzantine churches that there is quite obviously some connection between them. They are of fine white limestone; although they cannot be dated with certainty they are often assigned to the fifth century. In this case they must be the prototypes of the noble Constantinopolitan capitals. This is probably the fact, for, although some are of inferior workmanship, others are of great beauty, and most of them seem to be bright, original work and not degraded copies. Further, this type of capital appears suddenly full-blown at Constantinople. Byzantine capitals fall into several well-defined "orders." There is a bowl-capital covered with fretted carving, a poor example of which has recently been brought to the British Museum from Egypt. Another small bowl-capital decorated with palm branches, which seems to be a prototype of those in Santa Sophia, was sent to England by Prof. Petrie in 1911, and is now also in the British Museum.

A capital has been recently brought from Egypt, and added to the Berlin collection,

which is of the greatest importance for the history of Byzantine art. It is of the bowl type—of limestone, and quite small. The workmanship is exquisite, sharp and delicate beyond any example to be found in Constantinople; it is covered by a network of foliage detached from the ground by undercutting. This capital must have originated at the centre of inspiration for Byzantine carving. Another limestone capital of the

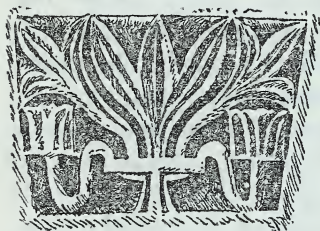


FIG. 26.

bowl type at Berlin, where for long they have earnestly collected specimens of Byzantine art, is carved with foliage of the kind shown in the frontispiece.

This is a capital at St. Mark's, Venice; it bears the monogram of Justinian, and was probably brought from Constantinople. But the capital at Berlin and several other carved stones show that the curious large-veined leaf was of Coptic origin. Another class is formed by the basket capitals which are carved into interlacing bands (fig. 27). The most splendid type of basket capitals is that which has a panel on each side containing a sort of a lily, and hence called the "lily capital" by Ruskin (fig. 26). The lily panel looks more like Coptic

work than anything else. Several varieties of basket capital have been found of Egyptian limestone, but this particular kind of capital, although examples are in the Cairo Museum, is always, I believe, of marble. There is an excellent basket capital of limestone in the Turin Museum, and there are two or three small ones in the Berlin Museum. Another variety is the melon form, a variety of the bowl class, which, instead of being circular under the abacus, spreads into an eight-foiled form. A very fine example of this is now in the Cairo Museum; it has foliage of the fig-leaf kind shown in frontispiece, which, as said above,

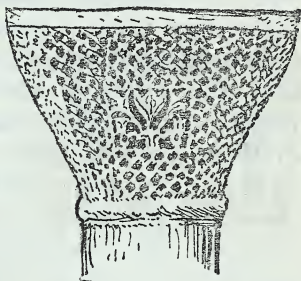


FIG. 27.

is Coptic, but the material is marble. Altogether there is already a great probability that the school of carving which developed the noble Byzantine orders was transferred to Constantinople from Egypt—probably Alexandria—by Justinian. Prototypes for some of the decorative ideas can be found in Hellenistic art—thus the “wind-blown acanthus,” the decorative unit of another type of capital; basket work on capitals; and animals or birds under the corners of

the abacus have been found in Hellenistic works.

Recently, at El Bagawat in a great oasis, some ruins of a large cemetery have been explored. It is so extensive that it has been called the Christian Pompeii. Probably there are nearly two hundred burial chapels, a large number of which have cupolas, many of which rise from pendentives continuous with the dome surface, the typical early Byzantine form. From what has been said above (p. 108) there is every reason to think that the building of domes on pendentives was an old Egyptian custom. The few details of these chapels show features derived from ancient Egyptian and Hellenistic sources; they are probably not later than the fifth century. The interiors were decorated by paintings, much in the style of the Catacombs. Another conception of the dome over a square is shown in some Egyptian ruins where the vaulting is brought away from the angles like four half-cones. The Persian squinch is a modification of this treatment.

It would be a mistake to try to trace back all Christian art-origins to Egypt; but, as the claims of Asia Minor, Syria, and Mesopotamia have been urged, it is well to point out that, so far as extant evidence goes, the claims of the Egyptian school to have led in

the change from Classical to Christian Art greatly preponderate.

All the remains of Christian buildings in Egypt have never yet been adequately studied. A great number of ruined vaulted structures exist which make it very probable that many of the constructive methods which characterized Byzantine art were taken over from Egypt. At the Convent of St. Simeon at Assouan there are some fine early brick

vaults of a semi-elliptical form, that is, higher than the semicircle. Against the main span are smaller parallel vaults which bring the work up to a level terrace. The great vault at Ctesiphon, in Persia, and others described

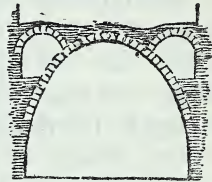


FIG. 28.

by Miss Bell, at Ukheithar, are so similar to these Coptic vaults that there must be a common tradition. It is recorded that Justinian sent the Persian king, Chosroes, workmen to build his palace at Ctesiphon; if it be true they may have gone from Egypt. There must have been vaulted basilican churches in Egypt from quite early days. Foundations of basilicas which had vaulted side aisles have been found in North Africa. Byzantine vaults were built in thin bricks set up on edge, that is *par tranches* stuck to the part already done in inclining courses, like the old Egyptian

and Assyrian vaults (fig. 12). In this way they were built without centring. Covel describes how, about 1670, domes were still built without centring.

It was said a score of years ago that there were probably three hundred ruined churches in Syria. Some are still nearly complete—"the stone white and clean; the eye instinctively looks for workmen, uncertain for a moment whether they are churches in course of construction or ruins." All is of wrought stone, the doors, roofs, and windows of stone slabs. In the buildings of Syria and Asia Minor several new methods and ideas were brought into architecture. Windows with arched heads are gathered in groups and a circular light is at times associated with them. Two round-headed lights with a circular eye just above were often used in the gable end of a church. Moulded courses were frequently set on the walls, especially under rows of windows; they were made to ramp to other levels or to bend over windows—that is, they became string mouldings and edge mouldings. Corbel tables were in use and a scalloped or lobed member was introduced over arches. The ultimate source of this last was the edge of the scallop shell, which so frequently filled the hollowed crowns of niches in late Roman work. This is very important, for through this adaptation the Roman scallop was the

origin of Gothic cusping. The lobed arch member is found at Qalb-Louzeh in Syria. It appears on the great front arch of the Persian palace at Ctesiphon. At the palace of Ukheithar the lobed arch becomes quite a Gothic form, as only a few large lobes were applied to a pointed arch (fig. 29, I). Hence the lobed arch passed to the Arabs and Moors,



II

FIG. 29.

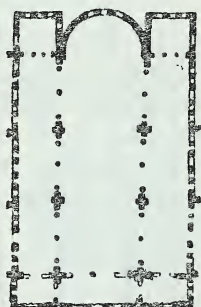


FIG. 30.

then it was taken up by the Romanesque builders of South France, and became the parent form of the great family of cusped Gothic arches. There is a difference between what I call the lobed arch and the cusped arch: in the former the series of scallops are complete, in the latter there is only a quadrant or half a foil at the bottom.

The widest difference between ancient and mediæval architectures is that one reposes, the other strives. In mediæval art features

are grouped, parts are subordinated one to another, jambs and arches are formed into a series of recesses. Already, in early Byzantine and Syrian works, the new idea is seen in operation, the colonnade of the atrium of Santa Sophia was cast into groups of three pillars between square piers. A very remarkable



FIG. 31.

example of grouping and subordination is found in the recently discovered church at Sergiopolis built by Justinian (fig. 30). The nave is divided from the aisles by three bays formed by big piers of a cross plan, and the spaces between have columns, one in the middle and two set against the piers. From these rise two little

arches, under the main arch which passes from pier to pier. It might be a Romanesque work of the twelfth century, but it is of the sixth century (fig. 31).

Another church in the same city had the remarkable plan shown in Fig. 32. The west front of a church built at Nicæa in the first half of the ninth century has doors with a series of recessed jambs and arches. An old

sketch of a church at Daulis, near Panopæia in Asia Minor, shows a barrel vault supported by a series of transverse arches or ribs rising from wall piers or imposts (see Fig. 33). Ribbed vaulting later became important.

The buildings of Syria and Asia Minor are for the most part of stone, yet the arches of important churches of the sixth century have the blunt-pointed form proper to the Egyptian brick arches, from which they must have been

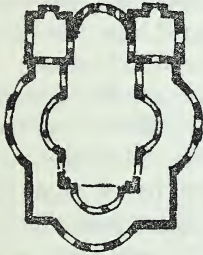


FIG. 32.



FIG. 33.

derived. A group of churches explored a few years ago at Bin Bir Kilissi in Asia Minor were assigned an early date by Strzygowski, but Sir W. Ramsay showed that they were more probably not earlier than the ninth century. Some of these were basilican churches with barrel vaults. Dr. Dawkins has recently published a vaulted church from Skyros, which is of the same type, and confirms the later estimate of age.

There were doubtless some Persian gifts in

early Byzantine art, as silk patterns and *cloisonné* enamelling, but the architectural influence was mostly in the opposite direction.

As early Christian art matured over a wide area several varieties were formed. The best known was the school of Constantinople in the age of Justinian, but there were other schools in Syria, Asia Minor, Egypt, which are gradually being made known to us. It would be well to keep the term "Byzantine" for the school of Constantinople and to use some such word as "Hellenesque" for the whole group.

Of recent years an acute Byzantine question has been discussed, which is: What part had the East in the transformation of architecture which led up to the Middle Ages, and what part had Rome? My own impression is that a distinction will have to be made between Byzantine architecture as a method of building and the same as expressing thought and feeling through building. There is not much in the structural system which was not Roman—the wider Rome of the Empire—although the expressional results differed so obviously from that of classical art. Building in brick, the erection of domes, the encrusting of surfaces with marble and gilt glass were all Eastern inventions, but they had all been adopted into "Roman" art, which passed them on to Byzantium. In a sense Byzantine art in

Eastern cities inherited such building customs directly, but yet Rome had intervened, and we cannot say what would have become of Hellenistic art without this intervention, or how much had been brought about by Roman organization and been stimulated by Roman patronage.

Late Hellenistic architecture must be considered Roman to the extent that it had been absorbed into the Empire, and the Byzantine structural system derives in the main from late Hellenistic sources. The spirit, however, was of the East—Christian, Jewish, Egyptian, Persian, Greek. There are certainly some important differences between the building forms used in Rome itself and Byzantine customs; the conception of a roof as a terrace through which groups of domes emerge from the interior, seems to be entirely Oriental, and this was the ruling conception in Byzantine vault systems. One of the first great churches at Constantinople, built during the reign of Justinian, was that dedicated under the invocation of the Holy Apostles. It was cruciform and was covered by a group of five domes. Such grouping of domes was unknown in Rome; it derives from sources such as those shown in Figs. 13 and 16. It is said that the Apostles' church was copied from a church at Ephesus.

In the glorious Church of Santa Sophia at

Constantinople, built by Justinian from 537, the great central cupola is surrounded by lower semi-domes and domes of various sizes, which heave up one above another like a cluster of bubbles. This Church of Santa Sophia is one of the great things of all time. It is very large, yet it is a unit, not an aggregation of many parts. The central area, over one hundred feet square, is extended to the east and the west by great semicircles, which increase the length of the central hall to over two hundred. From these hemicycles smaller apses break out, and along each side of the central area there are vast aisles supporting galleries. The size is gigantic, the more so as Byzantine churches are small, with this one exception. The scale and main divisions agree so closely with the Basilica of Constantine at Rome, that I think that building must have been taken as a model of size. We are told that the architect Anthemius had a brother in Old Rome. The arches of the interior are supported on magnificent columns of porphyry and *verde antico* marble, the walls are all plated with a veneering of choice alabaster, porphyry and marble, and the domes and vaults were covered with a vast area of gold-ground mosaics. The window and door frames are of marble, the doors of gilt bronze. The iconostasis and other fittings of the interior were of silver. The altar was enamelled gold.

After the age of Justinian, the sixth century, Byzantine art quickly declined in power. The time of the dispute about images (726-842) forms an interval between the primary style and a second age, which began to emerge in the ninth century and culminated from the tenth to the twelfth. It continued to exert itself through the later Middle Ages, and its traditions are not yet wholly forgotten in the lands of the Greek Church. To the classical age of Byzantine art we may set the limits 450 to 850; to the second school 850-1200; late Byzantine art we may date from 1200 to, say, 1800. During the early Middle Ages it had great influence on western Europe. Our William of Malmesbury knew of Santa Sophia, as "surpassing every edifice in the world." The second school of Byzantine art was largely influenced by the Persian; it became much more rigid and gloomy; classical liberality and grace were forgotten in a darker expression of Byzantinism, although in the paintings of MSS. an attempt was made to return to earlier ideals. The churches of this time were small, and they mostly conformed to one type of plan.

If a square space is divided into three in both directions; if at the intersections piers are built and a dome is set over the central square while the other compartments are covered with other domes and vaults variously

disposed; and if, further, a long porch extending across the front of the square is added—we obtain an approximation to the typical church plan of this time. Usually the central space was larger than the rest, frequently it was made octagonal, the dome rising from eight piers. The small domes of these churches are often raised on “drums” containing windows, they have almost become small octagonal towers.

The strong Eastern influence at work on later Byzantine architecture is shown by the fashion of carving bands of stone and of setting panels of brickwork to imitate Cufic writing. External brickwork was often arranged in patterns, a custom which seems to have been derived from Persia, where most elaborate arrangements were made in laying the bricks. Even some Persian domes were built with chevron patterns on the exterior.

Byzantine builders frequently used the pointed arch, even in the classical age of the style. At Kasr ibn Wardan, Asia Minor, built in 564, the arches and vaults are of pointed form. The general evolution of the Byzantine dome was from a hemispherical shape at Santa Sophia to a tower-like form, obtained by lifting the cupola proper above a “drum” pierced with windows. The question of the association of windows with the dome raises some curious points.

The first dome of Santa Sophia, Constantinople, fell, and was rebuilt to a higher curve a few years after the church was consecrated; it fell again in 989 and was again rebuilt. Even the first work must have had a series of windows pierced in it above the pendentives. Procopius speaks of the "small openings left at intervals for the light to come through," and doubtless they were exactly similar to those still existing in the semi-domes over the apses and the hemicycles. In these the domical surface is continuous from the walls; and there is no break in the curve at the window zone as in the present dome—a result of later heightening. The idea of putting a drum to contain windows between the pendentives and the cupola may have arisen from the break in the spherical surface made at rebuilding the dome of Santa Sophia. At Kasr ibn Wardan, built in the year after the first restoration of the dome at Santa Sophia, a ruined dome exists which has eight windows, which are pierced alternately in the pendentives and in the lunettes of wall between them. The pendentives are of a curious form, they are not continuations of the domical surface, but each horizontal section is a quadrant, so there is no distinct line of penetration with the walls. The dome of Santa Sophia at Salonica follows the same type with modifications; and this becomes

another reason for dating the church later than the great cathedral of the capital. At St. Clement's, Ancyra, probably of the seventh century, the dome has twelve great flutings to the interior and may have been melon-shaped outside, but the ruins are not sufficient to make this sure.

The most splendid and characteristic art of the Byzantine epoch was that of the mosaic worker, by which the upper part of the walls and the vaults and domes were covered by pictures in bright glittering colour on a golden background, which fills the whole interior with reflected lights, continually changing, according to the hour and the point of view. Parts of the exterior, like the gable of the west front, were also frequently encrusted with mosaics. At Rome, St. Peter's had its façade adorned with a mosaic about the year 450. Such an external mosaic exists at the sixth-century basilica of Parenzo, near Trieste; another of the same age, depicting the Nativity, filled the west front of the old basilica at Bethlehem. The fashion was long followed in Rome, and a beautiful late example is the mosaic of the enthroned Madonna with the Holy Child, and the Wise and Foolish Virgins, at S.M. in Trastevere. In the East the Dome of the Rock and the mosque at Damascus were decorated in a similar way. The usual way of finishing an interior was to line the walls with

slabs of fine marbles, often the two surfaces revealed by a saw-cut were opened out side by side, so that the panels showed symmetrical markings like beast-skins. Parts were treated yet more extravagantly with encrustations of sectile work and inlays of mother-of-pearl.

The debt of universal architecture to the early Christian and Byzantine schools of builders is very great. They evolved the church types, they carried far the exploration of domical construction, and made wonderful balanced compositions of vaults and domes over complex plans. They formed the belfry tower from the Pharos and fortification towers. We owe to them the idea of the vaulted basilican church, which, spreading westward over Europe, made our great vaulted cathedrals possible. They entirely recast the secondary forms of architecture: "the column was taught to carry an arch," the capital was reconsidered as a bearing block and became a feature of extraordinary beauty. The art of building was made free from formulas, and architecture became an adventure in building once more. We owe to them a new type of moulding, the germ of the Gothic system, by the introduction of the roll-moulding and their application of it to "strings" and the margins of doors. The first arch known to me which has a series of roll-mouldings is in the palace of Mshatta. The tendency to cast windows

into groups, the ultimate source of tracery, and the foiling of arches, has already been mentioned. We owe to Christian artists the introduction of delightfully fresh ornamentation, crisp foliage, and interlaces, and the whole scheme of Christian iconography.

CHAPTER IX

THE EASTERN CYCLE

UNDER the successors of Alexander the influence of Hellenistic art spread widely over western Asia and even beyond into India. At Gandara, on the north-west frontier, a mixed school of Græco-Buddhist art was formed, which subsequently reacted to some extent on the west. Recent discoveries of glazed clay images of men and horses in China show that about A.D. 500 the Western influence had made itself felt in the Far East. The Chinese tiled roof doubtless derives from the Greek roof. In the British Museum there is a sculptured fragment from the palace of a king of Armenia built about A.D. 200, which is in a debased Hellenistic style. In the Victoria and Albert Museum is a panel from a mosaic floor of quite ordinary Roman type, brought from Zeugma in Mesopotamia; and a rude form of Roman architecture was used by the Parthians. Fig. 34 shows some carved ornamentation from Gandara of about the first century. It is very interesting as being one of the earliest-known examples of a type of

interlacing patterns which later became widely distributed.

Some early Christian churches were built as far to the east as Nisibis and the Arabian desert, and as far to the south as Khartoum. The terrain which came to be occupied by Saracen conquerors in the seventh century had, for the most part, long been the scene of flourishing schools of Hellenistic, Roman and Hellenesque art.



FIG. 34.

Primitive Arabian art itself is quite negligible. When the new strength of the followers of the Prophet was consolidated with great rapidity into a rich and powerful empire, it took over the arts and artists of the con-

quered lands, extending from North Africa to Persia. In Egypt the Great Christian School of Alexandria was in full activity, and in Syria, Asia Minor and Mesopotamia, other varieties of Byzantine art were flourishing. In Persia the type of art of this period is known as Sassanian; its elements were in part old Persian, mixed with borrowings from late Roman and Byzantine sources.

The earliest Arab works, like the Dome of the Rock and the Mosque of Aksa, in Jerusalem, and the Great Mosque at Damascus

(c. 710), are almost perfectly Byzantine buildings except for some touch of added energy. They are the most beautiful works of their age. Some very interesting and beautiful early Arab works in Mesopotamia have recently been published by Sarre and Herzfeld. Fig. 29 (II) shows a cusped arch of the eighth century from one of the buildings.

Arab ornamentation, as it took on a more distinct type, about the eighth century, seems to show some Indian and Chinese influence derived probably from contacts in Persia. Even in the wonderful façade of the palace of Mshatta in Moab, now re-erected in Berlin, there seems to be a slight trace of Chinese feeling in the ornamental carving. What exists is the lower part of the front wall of the palace, including the central doorway. The wall is broken by semi-octagonal bastions, and the whole surface is covered with ornamentation, intricate as the pattern of an Indian shawl. Much of this carving consists of beasts drinking from vases, or of birds amongst scrolls of vine pecking at grapes.

Similar designs are found on Christian ivories wrought in Syria and Egypt in the sixth century. The origin of this remarkable building has been much discussed, but the writer is convinced that it is an Arab work not earlier than the seventh century, wrought in the main by Christian artists. In the

Berlin Museum are also some small fragments of similar work from the castles of Juba and Choirane which are assigned to the seventh and eighth centuries; and other palaces of a somewhat similar type are now known. The carvings at the church of Sergiopolis (fig. 30) are very similar also.

The early mosques were large halls with many slender columns supporting their roofs. These halls ran along one side of a courtyard, and were entered by doors in the long sides. Domes mark tombs rather than mosques; indeed it is said that no mosque that was not at least intended to contain a tomb ever had a dome. This custom must have been taken over from the Roman and Christian tradition of domed tombs. The Cairo domes are of stone, brick or clay. Those of stone are usually carved into chevron patterns or bold arabesque ornamentation. The brick domes are constructed in level courses without shaping the bricks, the true form being obtained in the plastering. Some of these are broken on the outside into a series of big rolls, diminishing upwards to the centre. Large mud domes were strengthened by a skeleton of rough timbers. Some few ruined domes at Cairo which seem to be of an early date (probably about 1200) have a lantern on the top pierced with windows and covered by a smaller cupola. Here we get the type of the

Renaissance dome. Probably the leaded domes of St. Mark's, Venice, were suggested from Arab domes of this kind. Some of the Cairo domes are built in two shells with webs of wall between the two, like Brunelleschi's dome in Florence.

The palace of Ukheithar, explored by Miss Bell, near the Persian frontier, seems to be of the eighth or ninth century (fig. 29). Another similar palace is Kasir-i-Shirin, and yet another is the palace of Amra, built in the eighth century.

Fragments of mosaics and paintings from Castle Amra are in the Berlin Museum; these were most probably by Byzantine artists. All these works are extremely interesting, as they open up a new field for the study of early Arab art; and in all of them Byzantine and Persian elements are mixed.

The later mosques and tombs of Cairo and western Asia are wonderfully beautiful. They have a universal quality; nothing is barbaric, and little is unintelligible; the architecture is as lovely as the word Arabian.

Domes in Cairo are pointed at the top; and with a fine instinct for size, the cornice is not at the true springing, but many feet below. A rough approximation to the form of the Cairene domes has been given thus: Draw a circle,



FIG. 35.

cut off one quarter of the vertical radius at the bottom and draw a level line, drop perpendiculars from the full diameter of the circle to this line; from the angles of this base draw two large arcs tangentially to the circle and meeting above it in a point.

Persia in the later Middle Ages became the most brilliant centre of Saracen art. The buildings of Tabriz, Ispahan, Samarkand, Sultaniah, and other towns, are many of them miracles of beauty, strange yet natural, like things seen in a dream. They have swelling domes, arched porches, wide and high, tall round minarets curiously like factory chimneys. All the walls are covered with tile-work painted in boldly drawn patterns. The Blue Mosque at Tabriz is a wonderful example of how the utmost splendour may be controlled into perfect dignity. The lovely dome of the Medresse at Ispahan is also wholly cased with tiles having patterns of bold interlacing curves, throwing off leafage like a big Persian carpet. These Persian domes are the most perfect ever built; in general form they resemble those of Cairo, but from the horizontal band they usually swell slightly outward, and the curve returning passes in almost a straight line to the finial on the apex. The shape is like that of a Persian helmet. The pointed form is, of course, the most easy to construct and the

most stable. Sometimes, as at Bostam and Koum, they are actual cones—a perfect constructive form which, curiously, has been little used. Buddhist communities were existing in western Asia when the Arabs entered the lands in the seventh century. Later again, under the Turkish dynasty (after 1250), artists are said to have been obtained from China. There is certainly in the art of Persia and Turkestan an element from the farther East. Mohammedan art in India is, of course, a form of the Arabic modified by local influences. Generally, the Arabian may be said to be an eastern offshoot of Byzantine art modified by Persian, Indian and Chinese elements.

Early and late the Arabian is a style of great splendour and clearness of expression. Save for its refusal of human interest in sculpture and painting, which were ruled out by the Mohammedan employers, it is one of the most intellectual styles. All is direct structure or frank ornamentation, and there is no survival of misunderstood forms.

The pointed arch was generally adopted, and often it was much stilted, that is, there were vertical pieces above the capitals before the curve began to spring. This may have arisen from the large use of marble columns, for in this way a bold, fine opening might be obtained when the arch rose from com-

paratively short columns. Another development of the stilted arch was made by continuing the upper curve below the true springing, which, of course, made the space less directly above the capitals, that is, the arch became of horseshoe form (fig. 36). Nook-shafts seem to have been first used in Arabic architecture. They are small shafts set in an angular recess L at the jambs of doorways



FIG. 36.

and other openings. Such shafts might be of small diameter and very tall, quite different from the normal classical column. Byzantine window slabs were developed into most elaborate and beautiful lattices, like those at the mosque of Damascus. All the lattices of the East, Indian and Chinese must derive from the Arab lattice. Minarets—very tall and slender towers—were built, which compare in beauty with Western spires. Foiled arches were carried further in design and handed to the West by the Moors in Spain. The dome was perfected as an external architectural form. Byzantine domes had been covered with lead, but these were completed in stone and brick, being sometimes cased over with brilliant glazed tiles.

These glazed tiles, which were largely used as external and internal casings, were doubt-

less derived from old Persian enamelled bricks. They were mostly made at Kashan, and similar "Kashi" decoration has continued in use until modern days. These glittering casings of hard enamelled material are a great architectural invention. There are many fine specimens of such tiles at the Victoria and Albert Museum. Marble casings and mosaics were also extensively used. An adaptation of Greek gold mosaic was obtained by making the gilt glass in little tablets like square biscuits, marked over by deeply indented lines forming half-inch squares. Possibly coloured glazing (not painted) was first made use of to form intricate patterns set in Arab lattices. The jewelled windows in the story of Aladdin were doubtless suggested by brilliant glass. These brightly glazed lattices are most beautiful. The basis of the typical Arab patterns is formed by producing the sides of polygons and stars till they intersect in many different ways. The germ of this system is already found in late Roman works like the ceiling at Baalbec, and many mosaic pavements.

By the Crusades, by trade, and through constant contact in Venice, Sicily and Spain, the Arab style steadily acted on the West, and its course in the East was parallel to that of the Romanesque and Gothic styles of the West.

From the first the Arab builder adopted the pointed arch. At Mshatta in Moab, the arches, of brick, were acutely pointed. At the Dome of the Rock (seventh century), the arches are bluntly pointed as finished with marble casings, but they are probably truly pointed in the structure. In the mosque El Aksa (c. 690) at Jerusalem, the arches

are big and strongly pointed. In the old portion of the mosque of Amr, Cairo (c. 650), there is a row of acutely pointed arches below and pointed windows over (fig. 37). The pointed arch was used in Byzantine work, but it was typical of the

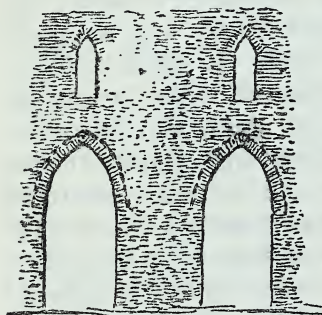


FIG. 37.

Arábian styles, and by the eleventh century it was widely distributed over Europe and reached England in the twelfth. As early as the ninth century the horseshoe form of arch is common in the painted MSS. of the Christian Visigoths (fig. 36).

The history of the cusped arch has been sketched on p. 145, so far as it affected the West; it spread also over the farther East. A screen at Ajmere in India, said to have been built from 1200 to 1220, has the arch shown

in Fig. 38. Venice seems to have received the cusped arch directly from the Arabs, and not like the West from the Moors. It is very curious that in the late Middle Ages Eastern arches became low with a quick curve at the bottom and the rest nearly straight, like our Tudor arches.



FIG. 38.

No doubt is possible as to the influence of Eastern patterns on Western art. The rich silks, especially, had an enormous influence on wall paintings, on ornamental sculpture, stained glass, embroideries and other forms of art. Dr. Rock says: "Coming westward among us, these much-coveted stuffs brought with them the several names by which they were commonly known throughout the East, whether Greece, Asia Minor, or Persia. Hence, when we read of Samit, Ciclatoun, Cendal, Baudakin, and such other terms unknown to trade now-a-days, we should bear in mind that we arrive at their derivations and discover in what countries they were wrought." In the 1245 Inventory of the Treasury at St. Paul's is mentioned a piece of red *pannus de aresia* embroidered with yellow parrots and trees, given by William Longespee on his return from the Holy Land in 1242. In the Inventory of 1295 three pieces are mentioned as of *opere saracenico*. The Exeter inventory

mentions several pieces of "Antioch." According to William of Malmesbury, Canute gave to Glastonbury Abbey a pall woven with vari-coloured peacocks. The body of St. Cuthbert was found wrapped in Eastern silks.

For more than a thousand years these precious works of art have been like a vitalizing pollen blown on our shores. If we would set seriously to work in reviving decorative design the best thing we could do would be to bring a hundred craftsmen from India to form a school of practice. Even Renaissance artists were not able to shut their eyes entirely to Eastern art—at Venice there was a strong Arab influence on the minor arts. From Venice a type of ornamentation spread westward which we still call Arabesque. It was brought to England by Holbein.

CHAPTER X

ROMANESQUE ART—NEW BLOOD IN ARCHITECTURE

THE age of Romanesque art was the age of the transition from antiquity to the Middle Ages, from Roman art to Gothic. The turning-point of style, as of history, seems to have been reached when Charlemagne consolidated his power. Up to this time the arts of civilization in Europe had been derived from the two Romes, but on this side of the watershed the prospect is towards the Gothic. From the Coronation of Charlemagne in 800 onwards, to the formation of Gothic art (say about 1150), the history of architecture is fairly clear, and the term Romanesque can be applied without any doubts to this period. It is much more difficult to give an account of architecture within the borders of what had been the Roman Empire, between the early Christian period and the establishment of Charlemagne's new empire.

In the fifth century there was a tremendous upheaval of society and disruption of culture caused by the folk-migrations and Teutonic

conquests. At this time, Goths and Franks spread from the lands east of the Rhine, through central and western Europe—that is, over the whole Roman Empire in the West. The Eastern Empire remained almost untouched, but of course not unaffected by the great change. In the West, Ireland was isolated from the rest of Christendom.

The Goths, it is true, were already partly Christianized, and in Italy, Provence and Spain there was no break in the continuity of the Church, nor was there in France, for Clovis, the conqueror, at once adopted Christianity.

In England, however, there was a long interval of chaos and only at the end of the sixth century did the tide of the common civilization return with the Church. The sixth century—a twilight time in the West—had been the most brilliant period of Byzantine art, the age of Justinian. Santa Sophia was being built just at the time that the deeds were wrought, the legends of which form the story of King Arthur.

In the Eastern Empire there was not only continuity, but an epoch of power under the sway of Justinian who more closely attached Italy to the Byzantine rule.

As the West settled once more it was natural that Pope Gregory should send his mission to the England which two centuries

before had been Britain, a part of the Empire and a province of the Church; thus the Rome of the clergy once more extended to the old limits.

Architecturally, there were now three strains of style: the Christian Roman tradition, sadly broken; Byzantinism, ever more and more powerful in influence from the sixth to the tenth century; and the barbarian element in the blood and likings of the people.

Until the coronation of Charlemagne the suzerainty of the Eastern emperors was acknowledged in Rome and throughout Italy. Ravenna and the south of the Peninsula remained attached to the East. The Byzantine genius at this time, say 500 to 800, so dominated the expression of the arts in Italy and the West that it would be well to call the style Byzanto-Romanesque or even Byzantesque.

Cavaliere Rivoira, however, has gone over the ground with the object of showing that early Romanesque art in Italy derives directly from Rome, and he minimizes the influence of the East. His work has been valuable in bringing out the variety and richness of Roman architecture, and in calling attention to many facts which had been overlooked, by a re-examination of the monuments. As I understand his work, his claim for the direct filiation of Romanesque architecture

from Roman applies almost entirely to construction. That there is a large Eastern element in the secondary forms, iconography and decoration, is not denied. It should be admitted that he has succeeded in carrying back to Roman days several ideas which had hitherto been thought to be Byzantine, and that he has shown that there was some continuity from the Roman to the Romanesque styles. Still the main question seems to stand very much where it did. That a new spirit came in with the new decoration no one can doubt, nor that both were Oriental. The spirit is the transforming force.

The Byzantesque, or primary Romanesque, style is only represented in Italy by a few monuments. In Gaul, at such centres as Lyons, Vienne, Poitiers, Tours, the arts would have been practised much as they were in Italy. In the south of France and Spain a school of considerable importance was formed in the Visigothic Kingdom, and there seems to be some evidence that the first vaulted churches built in the West were Visigothic. Another school was formed in England after about 600.

Mature Romanesque art is Carlovingian—the style of the Holy Roman Empire—Lombardic and Frankish. Charlemagne endeavoured successfully to form a culture centre in the heart of his great empire. The

palace-chapel he built at Aachen has a sixteen-sided outer wall surrounding a high central octagon; it is built of stone, the piers and doorways being of large blocks. Many of the details, especially the large western door, the remnants of which are now fully exposed previous to a restoration, were of late Roman type. The doorway has a wide stone architrave with a horizontal lintel of almost normal, late-classical section, and above the lintel is a semicircular relieving arch. The impost mouldings and cornices are classical. The capitals of the shafts are antique ones brought from Italy. The internal domical vault was covered with mosaics, doubtless by artists of the Byzantine school from Rome or Ravenna. There are some fine bronze railings forming the balustrade to the gallery story which surrounds the central area—these seem to be Byzantine, the doors are bronze, so also is a large fountain jet in the form of a pine cone. These last were doubtless made for the church, and are the first-fruits of the great bronze-working school of Germany.

Ireland, little affected by the Germanic incursions, developed a limited school of art, especially in the decoration of books, with complicated knotted and spiral patterns which was not without effect on the Carolingian school. On the other hand, the great Arab conquest of the seventh century must have

forced large numbers of eastern Christian artists from western Asia, Egypt and northern Africa into western Europe. Byzantine artists were easily obtained from Italy or from Constantinople itself. There was thus much crossing of artistic blood at this time.

After Charlemagne many of the emperors were art patrons, and during the Romanesque period many great Churchmen were also great artists. At the beginning of the eleventh century lived Bishop Bernward of Hildesheim, who formed a school of art in that city, where many of his works in bronze and precious metal remain. The famous bronze font at Liège, made by Ranerius of Huy early in the twelfth century, clearly derives from this school. It is a remarkable work, free, masterly and refined. Dunstan in England was an ecclesiastical artist of the type of Bernward. The monk Theophilus, who was expert in all the artistic crafts of the age and has left us an invaluable treatise on his practice, has been identified with Rugerius of Helmershausen, who was working about 1100.

Painting, ivory-carving, and enamelling were all highly developed in the German school. Mosaic floors were laid down, modelled stucco for figures and ornament was freely used, and the art of glass painting, it seems most likely from such evidence as is known,

was invented or adopted from Byzantine art by German monastic craftsmen.

From the evidence of carved ivories, painted books, enamels, and metal work, it appears that the great body of mediæval symbolism in sacred imagery must have issued from the monastic workshops of Germany and Lotharingia. We find on these at an early time ideas which later were widely spread over mediæval Europe, such as impersonations of the Church and the Synagogue. The Jesse tree also seems to have been invented (or handed on from the Eastern Church) by the German monastic artists. On the enamels of Godefried de Claire of Huy, working *c.* 1140–70, we find the Crucifixion accompanied by types out of the Old Testament so exactly like those which are well known in the stained-glass windows made from about the middle of the twelfth century up to about 1220 that it is clear there must be some relation one way or the other. The medallion treatment of these windows seems to be derived from the tradition of enamel work, and it appears probable to the present writer that the windows at St. Denis, the earliest stained glass now in France, were designed by an artist of the same school as Godefried de Claire—perhaps by himself, for he was the most famous artist of the age.

In building great things were done in

innumerable churches. These usually have their choirs lifted high above the nave, over vaulted crypts and reached by many steps. Frequently the west end as well as the east had an apse with an altar. Behind the high altar, in the centre of the choir, rose a colossal seven-branched candlestick of bronze; in the nave was a large corona of lamps which nearly filled the space from side to side. The walls and vaults were entirely covered with paintings—Christ or the Virgin attended by angels or apostles in the conch of the apse, and Bible stories in many bands on the walls. The exteriors had several towers; usually there was a pair to the east as well as a pair to the west, the space between the western towers was often carried up much higher than the rest of the nave, making with the towers an important Western work which is very characteristic of these churches. In Cologne, a chief centre in the eleventh and twelfth centuries, the Church of St. Mary in the Capitol, dedicated in 1049, has fine apses surrounded by ambulatories to the ends of the transepts as well as the central apse, which is also surrounded by an ambulatory. This is a very noble and impressive interior, the prototype of many mediæval churches. The most remarkable German Romanesque church is St. Gereon at Cologne. This has a large polygonal body, from each side of which,

except to the east and the west, opens a large apsidal niche in the thickness of the wall, and above these is formed a gallery. At the east is a long vaulted presbytery, to the west a big porch, and the central part rises high as a tower. It is a late Romanesque work, but it has been thought that the body with its niches is probably built over Roman foundations; a recent examination has convinced me that it is homogeneous in design. We find similar apsed niches in the Apostles' Church at Cologne, and the polygonal body with a gallery story seems to be adapted from Charlemagne's church at Aachen.

Altogether this building style was magnificent and complete; in Germany it competed long with the newer Gothic type of design developed in France at the end of the twelfth century.

In North Italy a noble school of mature Romanesque architecture flourished at this same time. This "Lombard art" was closely linked with that of Germany, but the Italian element in the population, the example of many antique monuments, contact with the East through Venice and Pisa, and the command of marbles as building material, gave it special characteristics. One curious and typical feature in Lombardic architecture is the setting of shafts at doorways on lions. It is found, I believe, in late Roman work, and

the fashion would seem to have been brought from Assyria. This base is occasionally found in Germany, as, for instance, the base of the central pillar of the old cathedral porch at Goslar. There is a small and imperfect application of the idea at the south nave door of Ely Cathedral. In Italy and Germany it was usual to group the columns of the nave between square piers. It has been suggested that it was because at first they used old marble columns and that possibly they were scarce; but it fell in with a general tendency to form groups, and seems to have been derived from the East (see fig. 30).

In France and Spain other fine schools of Romanesque art were formed. The conditions varied from centre to centre; here the Germanic re-barbarization was less complete, there Roman monuments had greater influence; here, again, the current of Byzantine art flowed more freely, or there was direct contact with the Arabs.

Nearly everywhere one element in the style is an attempt to imitate the details of Roman monuments—monuments which were often very late and divergent from the classical type. Thus in the museum at Sens there are large fragments of a late Roman work carved redundantly with vine ornamentation, and such prototypes were readily caught up in the advancing style. The important question

in the arts is, Are they developing or degrading? If they are expanding, hints from the most diverse sources will be gathered and recast according to the genius of the time.

In south-east France successful attempts were made to vault churches entirely. The experiments followed two types—continuous barrel vaults, as Notre Dame du Port at Clermont, or a series of domes, as at Perigueux. Both these types are ultimately of Eastern origin (see p. 43), but the barrel-vault type may have been taken over from the Visigothic school, while the domical type was more immediately adopted from Constantinople and the East. Vaulting with domes spread far north, so that the aisles of the abbey church of Bernay (c. 1030) are covered with domes; at the small church of St. George, close to Tours, there is a little dome remaining, and doubtless Bernay derived its domed vaulting from Tours. There was at one time considerable chance that we should have had a domed architecture in the North-west. The form finally adopted was the groined vault—that is, one which shows an arch in both directions, so that the windows in the side walls might rise nearly as high as the vault itself.

In the eleventh century one of the schools of building which rapidly developed was that

in Normandy; step by step the growing power of the Duchy was reflected in cathedral and abbey churches, and still more in the vast military castle-towers of which the Tower of London is a fine example. It seems to have had its prototype in the "Tower" of Rouen. Were these donjon towers contrived by the Conqueror himself? Norman architecture in its advance must have gathered largely from the Southern schools; at St. Nicholas, Caen, the bracketed eaves cornice might be at Issoire or Le Puy. The banding and chequering of two different coloured stones, a favourite device in Norman masonry, is Southern rather than German. The final type of plan in which an ambulatory and chapels surround the apse was derived from Tours.

Among the contributions made to architecture in the Romanesque period the first place must be given to the perfecting of the Cathedral plan, and, indeed, of its whole constructive type. The builders of after years had only to refine it to find themselves on the verge of Gothic. The problems of vaulting were worked out to the point where it became the controlling factor in the scheme. Ribbed vaulting, a great architectural power, was either invented by the Romanesque builders or developed from some Eastern source. The disposition of towers was tried

in every possible combination, and the stone spire was evolved. Some of the most perfect types were erected in the earliest Gothic days.

Successful attempts at dome construction were made over Italian baptisteries and some of the churches of France and Spain. On these cupolas the lantern appears which became a regular feature of the Renaissance dome. The cupolas over the baptisteries of Pisa and Florence are remarkable structural triumphs. That at Pisa reverts to the tall conical form of the Eastern cupolas. Wren's structural cone at St. Paul's resembles its form so closely that it would seem that in his preliminary studies he had found an account of the Pisan baptistery. The cupola at Florence is strengthened by a series of buttressing walls, which rise at right angles resting on the cupola and support an outer pyramid of masonry which is cased over with marble slabs like paving. It is an admirable and homogeneous piece of construction. On the apex the lantern sheltered an open eye in the cupola. This is the prototype of the lanterns of Renaissance domes, their ultimate source is the hood over the ventilator of early Eastern mud domes (fig. 15).

The general methods of the application of sculpture to structures was worked out

and most of the types of images and stories were introduced. Stained glass was perfected. The windows which were wrought in the middle of the twelfth century are more perfect than any others.

CHAPTER XI

SAXON AND NORMAN SCHOOLS

ALTHOUGH the Saxon and Norman styles of architecture were contemporary with the Romanesque art of the Continent it seems desirable to deal with them particularly. The study of both the Saxon and Norman periods of Romanesque art in England has been neglected. If we had a comprehensive and fully illustrated account of our early art, it would be seen that it is for us of extraordinary interest and had much of great beauty.

The Romans must have left many churches in our country, like the one whose foundations were uncovered in 1892 at Silchester. After the beginning of the seventh century Christian churches were erected once more all over the land. This was at the time when Byzantine traditions were strong in Rome and throughout western Europe. The churches generally were more or less basilican in type, either with or without aisles according to their size; they would have an apse at the east end and an atrium court at the west. At the close of the

seventh century St. Wilfrid built at Hexham a church in the form of a round tower with four arms; and at Athelney King Alfred built another in the shape of a cross with rounded ends—that is, a quatrefoil in plan. The abbey church at Abingdon, erected in 675, was 120 feet long, and rounded at the west end as well as at the east. The old cathedral of Canterbury also had this form. It has been assumed that this church was at first built with an apse to the west, in the early Roman manner, by St. Augustine, and that the eastern apse was built at a later time “to turn the church around,” when the eastern direction had become customary. This *type* of plan may first have arisen in this way; but many churches of this form existed in an early time in North Africa, and the cathedral of Canterbury may either have been built at first of this form, or Augustine’s church may have been entirely rebuilt subsequently. In any case Abingdon was erected on this plan, and so was the great church of St. Gall in Switzerland, and many later ones in Germany and France.

A plan drawn in the ninth century of the church at St. Gall, which shows this form, is preserved; it has been doubted whether it was actually built like this plan, but Addison, who saw the church before it was destroyed, seems to describe it so. Possibly the type

may have been introduced from England by some of the early missionaries to Germany.

Up to about 900, Saxon architecture would have been in the main based on early Christian and Byzantine examples, after that time a Carlovingian influence from the empire would set in. Already, during the early period, a form of braided and knotted decoration (fig. 34) was practised in book decoration and in stone carving; the same type of ornamentation is known all over Christendom in the eighth and ninth centuries, and in Rome itself much work of the sort is found. In Saxon England these patterns seem to appear at a very early date, and they were worked out in infinite varieties of complexity. It seems likely that there must be some special cause for this, and as very similar patterns appear in Coptic MSS. it is possible that some special Eastern strain was brought in by early monks, possibly in the time of Theodore the Archbishop, who was an Oriental. Some of the carvings of this type, with which the vine is associated, as on fragments of crosses in the library of Durham Cathedral, are of extraordinary beauty, and cannot be matched, so far as I know, anywhere else in Europe. Another mystery in regard to these crosses is the figure sculpture with which some of them are adorned. The great cross still standing at Bewcastle, and another at Ruthwell, are adorned with figure sculptures

of Christ standing on the dragon, of the flight into Egypt, and of other biblical scenes, which are most remarkable in the history of mediæval sculpture if the crosses are (and there seems to be little room for doubt) as early as they are said to be. Rivoira, without arguing the proofs for an early age, assigns them to the twelfth century, when figure sculpture in stone was becoming common in Europe. It may be remarked that these sculptures a good deal resemble those of early ivories, and I can only suggest that a fashion arose here of carving these crosses like ivories. After the time of Charlemagne the new school of German Romanesque must have strongly influenced our Saxon architecture. The abbey church of Ramsay, built 968-74, was cruciform, with a central tower and a smaller one at the west end. Winchester Cathedral, built in 980, probably had the same form. It had a crypt, a fine tower with a weathercock, and a vestibule. It has been suggested that a view of the church appears in the background of one of the illuminations of the Benedictional of St. Ethelwold, its builder. The churches at Athelney and Hexham, mentioned above, must have been very interesting examples of the central type of plan.

The noble eleventh-century (?) Church of the Holy Cross at Quimperlé in Brittany is a later and much larger example of the central form,

and possibly the last of the type built in western Europe. Of Saxon churches existing wholly or in part, several have apses. That of the church at Wing is seven-sided, not rounded, and is thus Eastern rather than Roman. St. Frideswide, Oxford, had three parallel apses. Many fine towers exist, of which that at Barnack is the most beautiful. This retains a precious little window of an early type, having a braided lattice pierced in a thin slab of stone.

On the plan of the church of St. Gall the towers are shown as circular in plan, like the earlier towers at Ravenna. The early church at St. Riquier in north France also had circular towers. The church at Abingdon which we have mentioned is described in the tenth century as having a round tower. The well-known round towers of Ireland belong to the same tradition. The famous leaning tower of Pisa is a late and ornate member of the same family.

One curious type of plan was that in which, as Mr. Micklethwaite put it, the tower "itself is the body of the church," a small addition to the east made a chancel; or there might be two extensions, one to the east and the other to the west. The church of Barton-on-Humber, where the large Saxon tower and the western extension remain, was of this type. Several Norman churches (notably Iffley)

which have only one span, with a tower covering the space in front of the presbytery, follow the same tradition. In the centrally planned churches the central dome or tower might very well come to represent the church itself. According to Enlart, the central tower of a church was sometimes called *domus aræ* in early French texts. It seems possible that when the eleventh-century description of the Confessor's church at Westminster begins by saying that the *domus aræ* was very high it refers to the lantern tower rather than to the presbytery as is usually supposed.

Several of the Saxon churches which probably belong to the eleventh century have rude little pilaster-strips at intervals; these seem to be derived from the German churches, many of which have such strips at the angles and at intervals, but much more systematically done than the English work. The tower of Sompington church has four gables in German fashion. Again, the mid-wall shaft with corbel capital spreading to the thickness of the wall is also a German, and ultimately a Byzantine, feature. Two flying angels carved over the chancel arch of the church at Bradford-on-Avon have their hands veiled in a manner often found in Byzantine art of the eleventh century. To the same age probably belongs the fine stone crucifix at Romsey Abbey. We may suppose that it occupied a place on the west gable of

the church similar to the defaced crucifix over the west door of the church of Headbourn-worthy, not far away.

A very large number of carved stone crosses, grave-slabs and fonts, as well as an endless number of fragments, exist which belong to the Saxon period. The Alfred Jewel, and other examples of goldsmiths' work, the coins, the embroideries from St. Cuthbert's coffin at Durham, and many wonderful painted books, all show that in Saxon days we had here a fine school of art maintaining close touch with what was done on the Continent. Many carved stones which show a cruder and more savage type of art are largely Danish and Norse, similar types are found in Scandinavia.

The quatrefoil early appears in Saxon work, and it became such a favourite form that one is tempted to consider it a Saxon contribution to European art. The quatrefoil was a cross with rounded ends, and the form was used in early Christian fonts. It first appears in the west on the coins of Offa, 757-96. It occurs as a frame for little subjects on the Winchester embroideries, c. 912, now at Durham, and from the tenth century it is frequently found in the decorations of English MSS. By the eleventh century it seems to have been adopted



FIG. 39.

into building, for windows and loopholes of this form appear in the illuminations of MSS., and on the Bayeux tapestry, which is almost certainly an English work (fig. 39).

The trefoil arch also makes an early and prominent appearance in Anglo-Saxon works. It occurs on the Missal of Jumièges, written in England about 1015 (fig. 40), and, curiously,

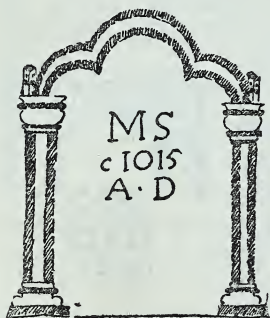


FIG. 40.

the earliest regular trefoil arches I know of in Norman buildings were those over some windows in the destroyed *Salle des Chevaliers* at Jumièges. Trefoil arches are also represented on the Bayeux tapestry (fig. 39). In English buildings the trefoil is found on the side door

of Ely Cathedral, and over some sculptured panels of the twelfth century at Lincoln. Fig. 41 is a doorway from the east of France.

A remarkable example is the early Gothic west door of Byland Abbey. The question arises whether the trefoil arch is a variety of the Arab lobed arch discussed above, or whether it originated independently in the West as half a quatrefoil. On Saracenic ivories foiled forms are frequently found, and, on the whole, I am disposed to think that the

foiled arch and the foiled circle are Eastern features. A remarkable example of the trefoil-arch is found in the thirteenth-century porches of Bourges Cathedral; here the bottom lobes are complete, as in Moorish arches. Still farther north, at Tournay, I have seen two doorways with trefoil arches which are distinctly Saracenic.

A strong Saracenic element was absorbed into Western art in the early Middle Ages. The bringing over of Arabic numerals is an example of what may have happened in the arts. The most marked instance of Arab influence is furnished by the imitation of Cufic writing as decoration, a fashion which obtained all over Christendom in the eleventh and twelfth centuries. The carved wooden doors of Le Puy are famous because of it, and the ornament appears in English twelfth-century decorations of MSS. A sharp, crisp type of carving which spread over the West about the middle of the twelfth century seems to have been imitated from Saracenic ivories. The pointed arch, as already said, was adopted from the East, so also was the building of arches in recessed orders with nook-shafts in the jambs. Interlacing arches, which became such a favourite feature in Norman archi-



FIG. 41.

ecture, are found in a highly developed form at Cordova in the ninth century. They appear first in the north as ornamentation drawn in Saxon books from about A.D. 800.

The cusped arch, or rather the lobed arch—for we may have to make a distinction if the bottom lobe is complete, or if it springs as a cusp—certainly originated in the East (fig. 29). It was extensively used at Cordova, and was taken up into the Romanesque building of the south-east of France. Then it strongly affected the German school, and passed to Normandy and England. Small lobed arches are found on the façade of Ely Cathedral. Spire design in the West was probably influenced to some degree in its development by the Eastern minaret. The masonry strongly banded together in two colours, which was so popular in Italy, may have had an Eastern origin. Patterns of Eastern stuffs were extensively copied in Western paintings and carvings. The painted ceiling of Peterborough Cathedral looks like an imitation of an Eastern rug. Zig-zag ornamentation is likely to have been first copied from Oriental fabrics. It is almost a general rule that carved decoration imitated painted ornament. Thus the “tabernacle,” which became a highly important architectural feature throughout the Middle Ages, first appears in painted books as a frame with an arched top and indications of building above.

It showed that the action of the picture was within doors.

The Norman form of Romanesque was introduced into England when Edward the Confessor rebuilt Westminster Abbey from about 1050 to 1066. Chroniclers say that no church like it had before been seen. Some years ago I suggested that it was probably copied from the Abbey of Jumièges, and further research has proved this to be the case. It seems probable that the king brought masons from Normandy to build it. The church was cruciform, with aisles to the nave and presbytery, which had two bays, and an apse. The side aisles were also terminated by apses. Over the crossing was a high tower. The aisles, and probably the central span as well, were vaulted. At the west end was a "vestibule." The abbey church at Jumièges had been begun in 1040. In its turn it had followed the type of the church at Bernay, begun about 1020. This fine early church, in a little decayed town half-way between Rouen and Caen, is now used as a corn store, but it is a most important monument for the history of northern architecture. It is cruciform, and had three apses, which are destroyed.

The three churches just described—Bernay, Jumièges, Westminster—were planned with parallel apses. A new and splendid type of plan, in which the apse is built on columns,

and thus opened out to a surrounding ambulatory, was brought into England at Canterbury and Winchester about 1075. The early Norman churches frequently had galleries in the transepts supported on vaults at the height of the aisle vaults. This was so at Jumièges, Westminster, Canterbury, and probably at Lincoln and elsewhere. This scheme brought columns into the spaces between the great crossing piers centrally in front of each transept; that is, the nave arcade was continued across the transepts. This may have given rise to the alternation of piers and columns frequently found in nave arcades, or it may have confirmed the tendency to form groups (see above, p. 146). The transeptal gallery must have been a remarkable feature. Sometimes it was reduced to fill a single bay at the end of each of the transepts. The triforium story was often formed into a gallery having a second vaulted roof, being lighted by a tier of windows above the aisle windows.

The vestibule at the west front was an important feature at this time. It is mentioned, as we have seen, in the description of Ethelwold's church at Winchester, built *c.* 980, and also at Westminster, built *c.* 1050. At Ely and Bury St. Edmunds the western bays of the churches were treated separately from the nave. Over the centre stood, in

each case, a large western tower, beneath which was the entrance; that is, the base of the tower formed a great porch. This western bay was also extended north and south of the general width of the church, thus giving a very wide and important façade. At Winchester, too, the Norman church, built *c.* 1080, had a similar central western tower. At Lincoln Cathedral the western bay probably formed a fine vestibule. Tewkesbury Abbey has some indications of a similar disposition. At Peterborough the cathedral was begun with a vestibule, but before the west front was built the fashion had passed away, and it was modified into an enormous open western porch. Westminster, as built by the Confessor, seems to have had two western towers. At Exeter two great towers stand over the transepts.

Some of these Norman churches were entirely vaulted. The early description of the Confessor's church at Westminster suggested that it may have had high central vaults as well as vaulted aisles. The Conqueror's small chapel in the White Tower is wholly vaulted. The apse and probably the whole presbytery at St. Albans were covered by vaults. The nave of Lincoln Cathedral was vaulted from 1141. Durham Cathedral, designed about 1090, appears to have been prepared for vaulting throughout, and here

the aisle vaults, built about 1095, have ribs. These may have been the earliest vaults with regular diagonal ribs ever erected in western Europe. The type became the characteristic vault of Gothic architecture, and only a few years ago ribbed vaulting was thought to be a special mark of the Gothic style.

At Quimperlé in Brittany the centre of the round church is sustained by four large piers, and the middle space is covered by a vault having four diagonal arches. It has been rebuilt, but there seems to be little doubt that it follows the old form. At Bayeux Cathedral, dedicated 1077, the space below the north-west tower is vaulted on two arches crossing from the centre of the sides, not from the angles. Both these seem to be earlier than the vaults at Durham; and at Montefiascone in Italy are some ribbed vaults which Rivoira claims to have been built in 1032. At Zara in Dalmatia is a vault on diagonal ribs which by an inscription is dated 1105. There are columns in the angles and "from the capitals spring two heavy diagonal ribs of plain squared stone underlying a vault which is almost a dome in construction."

It is curious that from the first introduction of ribbed vaulting into England, there was a tendency to divide the apse vault into three compartments by two ribs abutting against the centre of the arch. It was so at Durham.

The early crypt under the south transept at Christchurch has such ribs in the apse and not elsewhere. So has the old Norman church at Birkin, Yorkshire. This fact, taken together with others, may dispose us to think that the ultimate source for ribbed vaults was from Eastern ribbed domes, although the more general supposition is that they were first used under the intersections of cross-vaults.

At the end of the eleventh century there was a fashion in church-building to dispose stones of two or more colours in patterns. The dormitory at Westminster, Worcester Cathedral, and Exeter Cathedral had alternate layers in parts of the interior like piers and arches. The tympana of the triforium arches at Chichester have three or more colours arranged in patterns.

The interiors of the great Norman churches were fully painted with scenes, figures and patterns. At St. Albans, high up on the choir walls, are some big figures, and the arches are covered with bands and zigzags. At Canterbury one crypt chapel still retains its entire scheme, covering walls, vaults and pillars. At Ely, Chichester, Romsey and other places there are fragments from which a general scheme may be imagined. A church was not properly finished, at any time, until it was painted; and these Norman

churches inherited much of the Byzantine custom of making the interior into a great painted Bible. Doorways and other parts of the exterior were also frequently painted. Figure sculpture was not in general use until the end of the twelfth century. The doorway at Rochester, and the band of sculpture on the west front of Lincoln, can hardly be earlier than about 1170.

These mighty Norman churches when fresh from the hands of the various artists who built and adorned them must have been very marvellous works of art.

English Norman building was in the very front of the advance of architecture leading up to the Gothic, although in the actual achievement we fell behind. More great churches were built in England between 1066 and 1150 than anywhere else. Ribbed vaulting, during this time, became much more common in English churches than on the Continent, and several other features were developed here. I may instance the fine circular chapter house at Worcester; at Woodstock there was also a circular chapel, and a small one still exists at Ludlow Castle. This tradition seems to have led up to the characteristic English Chapter house, no parallel to which is to be found abroad. Round churches were built by others than Templars—for example, the round church at

Cambridge, and St. John's, Clerkenwell. Interlacing arcades were also highly developed here. There is a remarkable example in the wall arcading at Castle Rising, and at Romsey there is a triforium opening filled with interlacing arches in which the builders had really anticipated the invention of bar tracery, if they had only known it.

CHAPTER XII

GOTHIC BUILDING IN FRANCE—THE ARCHITECTURE OF ENERGY

THE form of mediæval society in Western Christendom was perfected in the thirteenth century. This was the great age of theological philosophy, of monastic expansion, of the organization of town communities, craft-guilds and universities, as well as of artistic fruition. A little earlier society was violent and architecture inchoate, a little later the forces of disruption appeared and romantic Gothic was to give way to merchant Gothic.

The architecture of the right moment answers in the most extraordinary way to our general ideas regarding the time; it is a crystallization of the Age of Romance.

The early part of the twelfth century was a time of great architectural ferment when several of the Romanesque schools of art seem to have started out in conscious rivalry to race for the lead. The school of the Ile de France took the first place about 1125, and Paris soon became the centre of mediæval

thought and art—the culture capital of Europe. Out of the intense furnace of ideas was to run the pure gold of a new style which is probably the most original of all theories of building. It is impossible to explain in words the content of perfect Gothic art. It is frank, clear, gay; it is passionate, mystical and tender; it is energetic, clear, sharp, strong and healthy. It would be a mistake to try to define it in terms of form alone; it embodied a spirit, an aspiration, an age. The ideals of the time of energy and order produced a manner of building of high intensity, all waste tissue was thrown off, and the stonework was gathered up into energetic functional members. These ribs and bars and shafts are all at bowstring tension. A mason will tap a pillar to make its stress audible; we may think of a cathedral as so “high strung” that if struck it would give a musical note.

The ground plan of a cathedral was slowly developed by ceaseless experiment in adjusting the parts so as to obtain maximum efficiency. A large French *chevet* in which a group of five or seven chapels stand about the central apse is a triumph of art—a perfect thing. A plan is the foundation and key of the whole construction. The enjoyment of a plan is an aptitude which will hardly come without considerable comparative study,

but the expert finds in it the theme and plot of a whole drama of building.

Churches of the first class in the thirteenth century were built to be covered by stone vaults, which vaults were membered—that is, made up of stronger supporting ribs and thinner webs filling between them; each “bay” or compartment being a sort of stone pavilion. These radiating ribs gathered up the weight and thrust at given points above tall and slender supports. The planning was thus the resultant of a sum of several exigencies. The site gave one condition, the size another, the necessities of vaulted construction a third, lighting another, and so on. Now, especially in a stone-covered church, the width may not be increased too recklessly, whereas the addition of length is easy. Yet obviously an interior may not be drawn out into too long a tunnel. Lateral annexes may, however, be added, especially opposite a central point, and such transepts not only increase the volume of the building, but, standing in opposition to the long central vault, they form supports to it. That this constructive expedient should also contain a symbol was a reason for the universality of the great cruciform church type. The long rows of arcades which support the vaults gather up a thrust against the outer end walls. It thus became reasonable to place towers at

the west front, the external termination of the longest ranks. At the east end the wall, turning in an apse, forms a kind of horizontal arch resisting expansion from within. Great churches frequently have towers also at the transept ends. The plan of a church was a thing strictly conditioned. Up to a point in architectural history, the planning of great churches, as has been said, was a matter of experiment, of adjustment and development within narrow boundaries, and the solution found was practical, geometrical and traditional.

This is true equally of the whole structure; a great church was not an essay in "design" for the satisfaction of "taste," it had been developed organically, and in the earlier time especially the organism was sound. When we speak of organic architecture, of active stonework and balance of forces, we have most in mind the mediæval masons' daring use of the arch as a means of construction. The arch at its simplest is a wonderful contrivance; it is a bow always tending to expand. If you bend a piece of cane into an arch between two piles of books, the books have to be heavy enough or they will be pushed asunder by the elastic bow. An arch is perfectly safe, and, indeed, inactive, as long as it is imprisoned, but let the restraining forces be an ounce too little and it will break

out like water through too weak a dam, and a moving arch is as terrible as a flood. The mediæval builders, when they had found their theory of construction, did not lock up their arches in great masses of masonry, like the Roman architects, but they set arch to fight arch, until two, four, eight or a dozen were balanced on one slender pier. They cross like the jets from a fountain, and spread like the branches of great trees so that old writers really thought that the architecture had been suggested by avenues in a wood.

The branching arches of the high vault were constantly exercising an expanding pressure against the walls of the clerestory, which themselves were suspended above the tall arches of the interior. To counter-balance this other arches were built in the open air, reaching up from the low side walls of the outer aisles and forming props to the central span. These flying buttresses, as they have been well called, were surely an extraordinary invention. In many French churches there are two tiers of these, which spring from tall, heavy pinnacles.

The design of the superstructure of a great church was conceived as a problem in equilibrium. The builders made an effort to do all that might be done in stone, and the possibilities of rearing stones one upon another were explored to the utmost. The structure,

as Morris has well put it, became organic. This was the law of growth in Gothic architecture.

The conception of a building as made up of an inert enclosing wall, pierced with holes for light, and with a roof quietly resting on it like a lid, the ruling data for many a noble building of other days, gave place to the thought of a structure which should be continuous throughout, and energetic in every part. The wall gathered itself up into tense shafts and piers, from which branched the ribs of the vault; the windows spread, to occupy the whole curtain of wall between the shafts, and in doing so almost inevitably became many-mullioned and traceried; the body thus became all post and space, a cage of stone.

From another point of view a Gothic cathedral may be compared to a great cargo-ship which has to attain to a balance between speed and safety. The church and the ship were both designed in the same way by a slow perfecting of parts; all was effort acting on custom, beauty was mastery, fitness, size with economy of material. Originality was insight for the essential and the inevitable. Proportion was the result of effort and training, it was the discovered law of structure, and it may be doubted if there be any other basis for proportion than the vitalizing of

necessity. Nothing great or true in building seems to have been invented in the sense of wilfully designed. Beauty seems to be to art as happiness to conduct—it should come by the way, it will not yield itself to direct attacks.

A noble building, indeed any work of art, is not the product of an act of design by some individual genius, it is the outcome of ages of experiment. The essence of a Gothic cathedral is its structure, not its adornments, though never so beautiful. A ship, like a cathedral, was decorated, but the ornament is not necessary to either, it is a gift over and above. The great ship had a colossal figurehead, luxuriance of scrolly carving around the poop, extravagance of gilding, and profusion of fluttering flags. The cathedral had much wealth of sculptures, paintings, stained glass, embroideries, gold and silver treasure. These things, it is true, were a part of the means of teaching and of ritual tradition, but they do not make up the essential cathedral. In one sense they were merely superadded, like the music and incense; in another, it is true, they themselves furnished real data to the builders. Thus a cathedral, in one aspect, was a stone shrine made with enamels of storied glass, in another it had to provide great stone avenues for stately processions, in which the whispering

and wailing organ might speak, and the cloud of incense might ascend. The cathedral satisfied all these conditions and others, and the response to noble requirements became a part of its own loveliness. Yet, as the ship beneath the bunting was a balanced structure of wood, and as the effort was always to get the utmost result from given means, so the great cathedral was a balanced structure of stone which found its perfected form at the limits where men could do no more. Thus it was that a cathedral was not designed, but discovered, or "revealed." Indeed building has been found out—like speech, writing, the use of metals—hence a noble architecture is not a thing of will, of design, of scholarship. A true architecture is the discovery of the nature of things in building, a continuous development along some line of direction imposed by needs, desires and traditions.

We used to be told that Gothic architecture was largely the result of the East acting on the West, mainly through the Crusades; Wren thought it should be called Saracenic. It has been the intermediate fashion to discard large views, and to work at particular areas and details, but it is probable that we shall have to come back a little way towards the earlier position. We have already spoken of the transmission of Eastern forms to the West in and before the twelfth century.

Much of the romance spirit which underlies the literature and art of the early Middle Ages seems to have been born of contact with the East; and the development of the Saracen schools of art was so parallel with those of the West that it seems probable, as Prof. Petrie has suggested, that both belong to the same great cycle.

In all, and behind all forms, Gothic art is a spirit, the expression of "an energy of the soul," and the art refuses to be driven as a whole under the yoke of any single formula. Attempts are frequently being made to measure it by "definition," and the art is relentlessly cut down where it does not fit this foot-rule, but such attempts are a mere logical pitfall.

In 1140 the abbey church of St. Denis, a few miles from Paris, was begun, and it was pushed forward to completion in a few years. Here the way which was to be followed by subsequent builders seems to have been found. It is the first building which we may properly call Gothic. The noble cathedrals of Paris, Chartres and Laon soon followed; then the mighty culminating group of Amiens, Bourges, Beauvais and Reims were built, and a host of other churches, smaller, but hardly less lovely.

The Gothic "style" was of course not merely a manner used for churches alone.

The castles, town-walls and gates, bridges and houses, were no less Gothic; sculpture, painting, stained glass, were all members of the one art.

With the fourteenth century came over-elaboration and formalism. In the fifteenth century much of the work done was extremely artificial and yet it was done with such enjoyment that it was still fresh and alive when in the sixteenth century it withered up in face of a fashion of building brought in by the Court from Italy.

Among the chief gifts of the great French Gothic school to the world of architecture was, first of all, the theory of energetic construction, by which a cathedral became a stone cage with films of stained glass suspended in the voids, a marvellous jewelled lantern. The most characteristic single feature is the traceried window which sustains this stained glass in thin bars of stone, vertical below, and branching in the arch-spaces into interlacing curves. The flying buttress is also a highly specialized power in this architecture. The intimate association of sculpture with the building should be mentioned; especially in the series of deep-linked porches with their great statues, lesser imagery and foliage. The spire was developed into a most remarkable feature. Only by building stone roofs at a very steep angle can the rain be resisted,

and it is desirable to hang bells high in the air so that they may speak far. These were the mechanical justifications for high steeples, but the rearing of tall landmarks was, of course, a manifestation of power and pride. Moreover, they fall in with the most marked æsthetic delight of the mediæval builders—delight in acute or intricate forms silhouetted against the sky. These spires were pierced through and through with belfry lights and foiled openings, and set about with skeleton pinnacles, so that the most astonishing effects result when they are seen in sunlight against blue sky, or all grey in the late evening. Tracery, pierced parapets, pinnacles, crockets, “tabernacles,” all show a similar liking for open work seen against the sky. Every mediæval town at a distance showed a fretwork of towers and spires.

The fairy architecture, the glory of the stained glass, the might of the bells, the sweet incense, the organ music and the splendour of the altars and vestments, all contributed to the most marvellous of all dramas—mediæval worship.

CHAPTER XIII

ENGLISH GOTHIC

ENGLISH Gothic is an offshoot from the parent stock of France. There were at least five moments from 1050 to 1250 when French styles of building were imported into England, and besides these there was continuous influence. From 1050 the Confessor rebuilt the abbey church of Westminster on the model of the church at Jumièges, and probably brought Norman masons here to execute the work. From 1066 a great outburst of Norman building followed on the Conquest. In the first half of the twelfth century the Cistercians brought in their new ideals of architecture. In 1174 the rebuilding of Canterbury Cathedral was undertaken by a master from Sens. Henry III began in 1245 to rebuild Westminster Abbey on the model of the French churches of the time, especially the cathedrals of Reims and Amiens. As instances of general influence we may mention that the abbey church of Beaulieu, Hampshire, was, so far as can be judged from the foundations, practically a copy of that of Clairvaux; at

Minster in Kent, and other places on the south coast, we find the rows of quatrefoils under string mouldings which are so characteristic in the architecture of Normandy; and the west door of Rochester follows a French type.

Besides all this there were regular commercial exchanges of works of art—black tomb-slabs and fonts from Tournay: lead fonts from Normandy: stained glass from Rouen: enamelled effigies from Limoges: plate from Paris. The inlaid floor before Becket's shrine at Canterbury is fine French work, *c.* 1220. In turn we exported embroideries, and (after 1350) carved alabaster works.

Henry III loved the architecture of France, and Robert de Bury, Bishop of Durham in the fourteenth century, praises Paris as a Paradise. Wren quite rightly says: "We copied Gothic architecture . . . from France, the fashions of which nation we imitated in all ages, even when we defied them!"

A transition leading up to Gothic was very widespread by the middle of the twelfth century; even before this time the master of the church of Ernulph at Canterbury had plainly aimed at refinement rather than at boldness, a turning-point of style. The first Cistercian architecture at Fountains and other monastic houses is distinctly of a transitional character. And it can hardly be doubted that there was a direct develop-

ment of Gothic in the Cistercian abbeys under continuous French influence. Recent examination of Wells Cathedral, which was being built in 1190, has convinced the writer that it is built in the Cistercian tradition, wholly, or almost, free from the influence of Canterbury. Practically all the details (excepting the west front) come from Cistercian sources.

The new fashion of cathedral-building introduced at Canterbury Cathedral as rebuilt from 1174 rapidly spread over England. The Cathedral of Lincoln, begun about 1190, shows close study of Canterbury, and in turn Lincoln influenced Holyrood. All these had sexpartite vaults; that is, beside the two diagonal ribs in each bay there was a central transverse one dividing each compartment into six, a favourite French fashion. York, Beverley, and other churches drew inspiration from Lincoln.

There may have been an independent Gothic centre in the northern archbishopric. Ripon Cathedral is said to have been begun by Archbishop Roger, who ruled from 1154 to 1181. But there is no reason for putting it so early as Canterbury. Indeed, if it was only *begun* by Roger, we may assume that he did not live to carry it far, and that the beginning of the work was about the year 1180. Roche Abbey is as early as, or earlier than, Ripon, and it is probable, on the whole,

that this northern school of Gothic was developed at the Cistercian centres independently of Canterbury, but, of course, as an offshoot from the Gothic of France. There is some other evidence for direct French action on Yorkshire, although it may be that York followed the lead of Canterbury in turning to France for new inspiration. However, there is little that cannot be accounted for by the Cistercian tradition. A fine sculptured doorway, fragments of which exist at St. Mary's, York, is almost accurately French. A splendid fragment of a stained glass Jesse tree which is preserved in York Cathedral must have been almost a duplicate of windows at Chartres and St. Denis. As such a subject, it may be noted in passing, belongs to the cycle which would have filled the eastern windows above the altar, the fragment doubtless belonged to one of those which originally lit Roger's presbytery. At Bridlington, among the fragments, are some remarkable carved capitals which are in a foreign manner. There is also in this church a fine black grave-slab imported from Tournay.

Westminster Abbey, begun in 1245, opened a second chapter in our English Gothic. Its windows, which were copied from Reims and Amiens Cathedrals, were quickly imitated all over the country. Its flying buttresses, with their double tiers of arches, were copied

at St. Albans, and its sculptured door was imitated at Lincoln. The plan was repeated at Hailes Abbey, and the chapter house and cloister were closely copied at Salisbury. The most of our transitional and Early Gothic works may be classed as belonging to (1) the Cistercian school; (2) the Canterbury school; (3) the Westminster school.

We must consider in some detail the characteristics of Gothic building through a knowledge of which the age of any particular work may be told at sight. A transition leading towards Gothic is visible in works built about 1150, and the Gothic manner of building lingered on until the middle of the sixteenth century. We may thus give to the Gothic style a total period of four centuries. In 1348-1350 occurred the great plague called the Black Death, which cast its shadow over all the arts so that they never recovered their earlier sweetness and elasticity of style. From this time Later Gothic begins, and it is well to remember the date, 1350, as the key to the chronology of English art. By putting two centuries in front of it we get 1150, the date of beginning, and adding two centuries we obtain 1550 for the death date.

The various criteria of the progress of the changing style were discriminated after a long comparison of documents recording works of building with the fabrics themselves. It

was found that many works recorded as built in the twelfth century were massive round-arched buildings lighted by simple windows; those of the thirteenth century were elegant, with sharp pointed arches, and so with the distinctive marks of the rest. Then, from all these fixed points the general tendency in the course of architecture could be inferred. The curve, as it were, of architectural development being once laid down, it became easy to fit buildings of which no record exists into their proper place. After a time certain contradictions arose, and some works were occasionally found at strife with the seeming testimony of the records. In such cases either the records may be wrong or misread, or the examples in question are misunderstood; they may have been belated, or have belonged to an eddy of style. Gradually assurance grows until an expert considers himself safe in dating a building at sight, in most cases, within ten years.

These styles, then, are but lengths marked off on a continuous chain; there is no disruption or sudden change anywhere, but a constant merging of what was into what was to be. We use the word style, also, in a larger sense as the Romanesque style, or the Gothic. A style-development in this sense, from its infancy to maturity, is the coming of another summer of art.

The terminology relating to the history of mediæval architecture has fallen into some confusion. Although the matter may be thought to be only one of words, the present lack of agreement must be as puzzling and disheartening to the student as irritating to the scholar.

Every one acknowledges that where there has been a process of continuous development, as was the case with mediæval architecture, all delimitation into periods is arbitrary. There may have been quicker and slower moments of change, but any attempt to deal with these by tracing them to their origins results in too great uncertainty and confusion to make their periods the basis of a scheme of classification. To take an illustration: we must cut off the periods of manhood from youth, and youth from childhood, arbitrarily or not at all.

The scheme that has been popular, and which, I believe, has shown itself to be so practically useful that it must persist, is founded upon the necessity of relating some striking characteristics in the art to the *centuries* during which the varieties prevailed. The terms Early English, Decorated, and Perpendicular are by themselves, perhaps, not very satisfactory, but as general descriptions of the most typical forms of architecture prevailing during the three great

centuries of the Mediæval Period they are irresistible. We all began to “discriminate the styles” by making these points firm. No learner can grasp exactitudes at once in such questions, and all attempts to make “Early English” begin, say, in 1174 or 1189, are quite vain. The student needs first an anchorage in the centuries, for nothing beside them is fixed, and unless this is accepted every writer is drawn into refinements of his own and anarchy. One quite gratuitous source of confusion has been found in linking the styles to the several kings. The date 1189 has been suggested for the beginning of “Early English” because Richard I began to reign in that year.

With the forms of art prevailing in the three great centuries have become firmly associated, as above said, the names Early English, Decorated, and Perpendicular. Now by extending the scheme, again by centuries, we get from the year 1000 to the year 1600, the easily remembered series of six periods thus—

Eleventh century .	.	SAXON.
Twelfth century .	.	NORMAN.
Thirteenth century	.	EARLY ENGLISH.
Fourteenth century	.	DECORATED.
Fifteenth century	.	PERPENDICULAR.
Sixteenth century .	.	TUDOR.

There is a slight awkwardness in that three of these names are descriptive, while the others are historical, but for the fourteenth and fifteenth centuries it would be easy to follow the model of "Early English" and to interchange (but not substitute) such terms as Mature English or Middle Pointed with Decorated, and Late English with Perpendicular.

It has often been rightly pointed out that the process of change was too rapid for the characteristics of the architecture of a whole century to be fully covered by one descriptive name. "Early English," being a chronological term, would easily serve for the thirteenth century, but not so the descriptive term "Lancet," with which it is frequently equated. Nor will "Decorated" well serve for the whole of the fourteenth century, although it describes the most striking type of architecture in that century. Taking these terms, however, as they stand, it appears that, having fixed the broader terminology for the centuries, we may go on to say that the more characteristic forms of the styles so named are found in every case during the first half of each century, the latter half being a transitional era. Thus, Norman to 1150, Transition to 1200, Early English to 1250, Transition to 1300, Decorated to 1350, Transition to 1400, Perpendicular to 1450, Transition

to 1500, Tudor to 1550. It happens that several secondary terms in current use would serve to define most of these transitional half-century periods picturesquely, and with substantial accuracy. Combining all into an extended list of twelve periods, we get the following, which forms a sort of Zodiac of English architecture. Beginning with the year 1000, the period 1000-1050 is Saxon; 1050 to 1100 is Early Norman; 1100-1150 is Mature Norman; the period 1150-1200 is known as The Transition (for works like Canterbury we might say First Gothic); 1200-1250 is Lancet; 1250-1300 is Geometrical; and 1300-1350 is Curvilinear. For the period 1350-1400 we have no convenient name other than Late Decorated, unless for the sake of symmetry we could tolerate some new term like fretted, or tabernacled, or Chaucerian Gothic.

“Many subtill compassyngs,
As barbicans and pinnacles;
Imageries and tabernacles
I sawe, and full eke of windowis,
As flakis falling in grete snowis.”

The period 1400-1450 is represented by the Mature Perpendicular, but if this term has too wide a meaning to be limited to so short a period, we might use Lancastrian (Henry IV

succeeded in 1400). An old term, Rectilinear, might well serve for the time from 1450–1500, or we might also use Yorkist. 1500–1550 was Tudor. Beyond these twelve phases of mediæval art in England 1550–1600 was Elizabethan, 1600–1650 was Renaissance.

The terms Norman, Early English, and the Transition coming between the two, are historical and self-explanatory; the others are descriptive and need some further elucidation. Lancet describes the simple pointed windows in use before compound windows of tracery were invented. Geometric, which followed, describes the earliest form of traceried windows, which were designed in simple compositions of foiled circles above lancet lights. The next phase, Curvilinear, or Early Decorated, marks a modification; the forms flowing into one another in more complex shapes. In Late Decorated, a highly ornate style, the tracery tends to stiffen once more, a number of vertical lines being introduced. This Late Decorated, in a word, forms a transition to the next phase, described from this characteristic as the Perpendicular style. In Late Perpendicular, or Rectilinear, vertical and horizontal lines are still more strongly marked, arches are flattened and enclosed in straight-sided forms, and the whole surface is often covered with panelled tracery. The Tudor style carried on this manner with the growing

intrusion of forms derived from the Renaissance architecture of the Continent.

The acceptance of such definitions of terms will not at all tie the investigator who is working at the origins of any particular phase of style. The origin of Perpendicular, for instance, may be pushed back to 1380, 1360 or 1340; the Decorated can be carried back into Early English, and Early English into Norman. When we consider any of these separately we can enlarge their periods as much as we like. But in a schedule of the sequences of styles, Perpendicular, if it is to mean anything fixed, must be held to begin at midnight, December 31, 1399. We must hold that up to that moment enough of the earlier tradition survived to make Perpendicular-like compositions really only Late Decorated. In a similar way, summer has to be violently divided from spring, and spring from winter, whatever the weather may be like. When we come to apply any system to some given example there may sometimes seem to be a difficulty. Thus, Canterbury Cathedral, begun in 1174, is certainly Gothic. However, there is no contradiction in allowing that sporadic cases of First Gothic fell in the Transitional Period. If our terms mean anything fixed, we can somehow contrive to be precise. The point to get clear is, that a connection has been established by popular

usage between the three best-known style names and the thirteenth, fourteenth and fifteenth centuries.

Parker, in the *Concise Glossary* (1869), divides the periods thus: Norman, 1066–1189; Early English, 1189–1272; Decorated, 1272–1377; Perpendicular, *c.* 1350–*c.* 1500. Sharpe, in his excellent essay, *The Seven Periods of English Architecture* (1871), gives the several styles periods which vary in length from forty-five to one hundred and ninety years, and begin and end at dates which also are quite impossible to remember. Thus: Saxon, up to 1066; Norman, 1066–1145; Transitional, 1145–1190; Lancet, 1190–1245; Geometrical, 1245–1315; Curvilinear, 1315–1360; Rectilinear, 1360–1550. To recapitulate the results which we may hope to retain in our memory:—

The mid-point of Gothic architecture was in 1350. In 1150 it began, in 1550 it ended. The first two centuries were the period of Early Gothic, the last two the period of Late Gothic. The most characteristic phases of the Norman, Early English, Decorated, Perpendicular, and Tudor styles fell in the twelfth, thirteenth, fourteenth, fifteenth and sixteenth centuries, and these names may stand more exactly for the styles as they were in the first halves of those several centuries. That this should be so agrees conveniently

with the fact that the main points of beginning, middle and end of the whole span of Gothic fall in the middle of the twelfth, fourteenth and sixteenth centuries.

The word Gothic was applied at the Renaissance to art which was not classical, but it has come to mean the most characteristic mediæval art in western Europe. An attempt, however, has been made by a distinguished writer, in an able study of the style, to show that English work is not "true Gothic," and that it has no claim to bear the same name as the great French mediæval art. And he suggests that it might more properly be called the Pointed style. It should be admitted that English work is inferior to the most perfect ogival architecture of France, but it is a mistake to define any class by the qualities of its highest members. There is room in the class for better and worse, even for good and bad. It is a mistake, also, to attempt to define Gothic art by a mere architectural formula. The word Gothic applies to much more than architecture, and Gothic architecture answered to a spirit, an atmosphere, a moment and an environment. It is the building style which responded to the mediæval civilization in western Europe, the centre of which was the Ile de France. But this, of course, was not a centre without a circumference.

The general perception of likeness has led to giving the name of Gothic to a type of building the traditions of which spread from the Ile de France, Picardy, and Champagne; and the word has been in use in England for three hundred years. If only the culminating works of the thirteenth century in France are to be called Gothic, what is the rest to be named? May we say Gothic of Burgundy and of Normandy? If so, why may we not say Anglo-Norman, or English Gothic? That England was saturated with Frenchness in the thirteenth and fourteenth centuries need not be said. According to a recent French writer on Chaucer, his inspiration, his outlook on life, the atmosphere, the framework of his powers, are French—French of France, Champagne, or Burgundy, not Norman or Breton. "His spirit is French, like his name. He descends in a straight line from our trouvères, and he has everything except their tongue."

We have no more claim to call our architecture Pointed than Gothic, for the logic of pointed construction was best understood at the Gothic centre. In England the round arch lasted long, and as the style grew old the arches tended to lose their points. As everything was done better somewhere else, should English work have any name at all? By the use of special definitions, contriving a

“fundamental difference,” anything may be proved.

On the other hand, some English writers make over-patriotic demands for the independence of English Gothic, and we are prone to date our works too early where it is not altogether impossible. Thus in Oxford Cathedral, of which at least a part was dedicated in 1180, most of the carved foliage distinctly appears to be affected by the style of the work begun in Canterbury in 1174; yet in recent books we find its beginning put somewhere near the middle of the century. Examination of the fabric itself shows that the small presbytery was first completed as a separate work, and *this* is probably all that was dedicated in 1180. It might have been begun as late as 1175. Part of the carving in this presbytery is of an earlier type than that at Canterbury, but much of it appears to be later.

The nave of Rochester Cathedral, with its sculptured west door, is assigned, in the most recent and thorough study of the subject, to about 1130, although to the present writer it appears that it must be thirty or forty years later. The search for variety of form, which is obvious in the plans of the nave columns; the carving of the fronts of the triforium arches, which include small foiled panels; the pointed arch of the passage at triforium

level; the type of bay design, in which the triforium story is included in the interior height of the aisle; the west front, with its sculptures, dog-tooth ornament, incipient trefoil arches, and other points, all show it to be a transitional work. Whitby Abbey is said to have been built early in the thirteenth century, but the wall arcade of the transept has tracery that cannot be earlier than 1250, and it may be doubted whether the church was begun much before the middle of the century. Important parts of both Fountains Abbey and Wells Cathedral have also been pushed too far back. Merton College Chapel has been dated *c.* 1270, but it has recently been shown that it was built from 1294 to 1297.

French authors also make extravagantly exorbitant demands on their side. Thus, M. Emile Mâle has lately annexed all English stained glass up to the fourteenth century. Now, the Guthlac roll in the British Museum is guaranteed by all experts to be an English work of the latter end of the twelfth century, and to be a set of designs for stained glass windows. If technical designs for stained glass of a high quality like these were made in England, there must at the same time have been a school of glass-workers here; and much of our thirteenth and fourteenth century glass is obviously not French.

Dr. M. R. James has given reasons for thinking that the superb glass of Canterbury choir was at least designed on a scheme drawn up in England, and we know that stained glass was made use of at Durham as early as the time of Bishop Pudsey, who glazed the choir of the cathedral.

The special contributions which were made by the English school to the traditions of Mediæval Gothic art were: the octagonal chapter house, of which that at Westminster is the most perfect type; the working out of several fine varieties of open timber roofs, and the early elaboration of curvilinear tracery, which possibly, to some degree, reacted in forming the flamboyant stonework of France. The ruling temper of English Gothic at its high time is a spirit of sweetness which contrasts with the soaring grandeur of the French cathedrals.

The theory of stonework construction at maximum stress was never perfectly grasped, but still English work is truly Gothic. To attempt to prove that it is not, is like proving that a rustic is no man. It can be easily done by manipulating definitions, but he remains a man after all.

CHAPTER XIV

THE RENAISSANCE—ARCHITECTURE OF RHETORIC AND ARCHITECTURE OF FIRST PRINCIPLES

AFTER the Lombard invasion, and especially after the establishment of the Empire of Charlemagne, in the early Middle Ages, northern Italy was split up into many city-states which owed allegiance to the German emperors; the only central power in Italy was that of the Pope. When the mediæval culture, of which Dante was the perfect flower, matured, Italy was already the most learned country in Europe. Its artists and scholars were in daily contact with the monuments of the past, and they could do no other than look back to the splendour that was Rome. As the study of antiquity progressed, it was perceived that the buildings of the "Dark Ages" were of an entirely different spirit from those of Rome. Raphael, an eager antiquary, called them Gothic, by which he meant that they had followed on the Gothic invasions, including in this term alike the architecture of Theodoric the Goth in the

sixth century and that of Countess Matilda in the twelfth. These things were alien, barbarous. They were builded evidence of the conquest of the true Italians by the "Tedeschi."

A revival of national feeling, and of ancient letters, necessarily carried along with it an endeavour to resume the ancient and glorious art of Rome. Thus the Renaissance in Italy was a "nationalist" movement and a "modernist" one as well. According to the new programme of learning every phenomenon was to be studied and seen as it was. History, science, antiquities, were all alike branches of human knowledge. Withal Rome had never passed out of sight. Theodoric had issued orders for the protection of the city. Here and there people still dwelt and worshipped in Roman buildings; the writings of Vitruvius had continued to be copied as a mysterious guide in architecture; and such a mediæval work as the Baptistery at Florence was almost classical in largeness of style and in the antique form of its details.

The Renaissance in Roman Italy was thus a perfectly natural impulse, and was, indeed, inevitable. Perhaps if it had taken some different turning it might have been more obviously beneficial; as it was, there was not only eagerness to learn and to bring back forgotten powers to architecture, but there

was eagerness, as well, to forget what the intervening time had gained. In looking back, art loses its life.

Outside Italy, in Germany, France, and England, the movement is less easily understood. The court of the popes was the centre of European culture, and the fashion to follow the lead of the most advanced country sprang up in all the other courts of Europe, so that a great break with the near past was made. This revolution was something like that which has happened in modern Japan. One great social consequence which such a change must have, in Europe, or in Japan, is that art becomes divorced from the people. Art had been a common aptitude by which customary needs were satisfied, but after such a disruption it was understood only by experts and connoisseurs who themselves only thought they understood. It is very confusing to speculate why that which happened, and "was to be," should be at war with life. The Renaissance has led to noble expression in individual arts where there was a second inspiration as well as that of antiquity—the sculptures of Michael Angelo, the portraiture of Velasquez, the landscapes of Claude and Turner—but in all these direct reference to Nature comes in at the source. Such refreshment was excluded from the purview of the sanctioned architecture in the grand

style. In early times, especially, very beautiful mixed works were wrought, but the Roman revival as a whole has proved arid and sterile, nothing grows from it. It may be, but this is the vaguest theory, that in this second-hand dealing with Rome the influence of the East has been too entirely strained out, and that there must always be a circuit established between East and West by which art may be vitalized, as first at the beginning we found Egypt, Europe, and Mesopotamia reacting upon one another.

As another consequence of its remoteness from the people Renaissance art came to be thought of as a matter of pride and pretty shapes, of taste and appearance. It was not generally seen that great art like great science is the discovery of necessity; although Leonardo da Vinci—and in a less degree Wren—did reach this concept of the meaning of art. To discover this is to reach to the universal in architecture and to a point of view which looks on all styles as accidents of an environment and a moment. All vital schools, however, knew this instinctively, as knowing no other. They did not theorize, but built.

It must, I think, be admitted by those who have in part understood the great primary styles, Greek or Gothic, that the Renaissance is a style of boredom. However beautiful

single works may be, it tends to be blind, puffy, and big-wiggy; Louis Quatorze might have said of the art of his court as he did of the state, "It is myself." Its highest inspiration was good taste, it was architect's architecture. Splendid works were wrought even in the age of its gloomy maturity by Peruzzi, Michael Angelo, and Wren, but as a whole it seems to be the art of an age of Indigestion. There are things in Nature—a dewy morning, a snowy peak, a clear stream—which are ever and again more wonderful than we had remembered. A true work of art always has something of this surprising freshness; but the Renaissance as a whole lacked the spirit of life. Gothic art witnesses to a nation in training, hunters, craftsmen, athletes; the Renaissance is the art of scholars, courtiers, and the connoisseurship of middlemen.

The Renaissance made itself felt in different centres during the fifteenth century. At Florence a beautiful mixed style which followed traditional spacing and changed only the forms of cornices and other details, prevailed for a time. In Venice veneering with marble, inlaying with porphyry and the use of coloured materials in construction was long continued from the earlier Byzantine tradition. Only gradually, and by later masters like Palladio, was the "true antique" imposed as a dogma; it even seems to have

been held in some half-realized way, that the "orders" had been specially revealed as the only absolute architecture; nothing else can explain the awed devotion of the expounders and commentators of the text of Vitruvius.

It fell out, however, that the chief works which had to be built were not columnar temples, but palaces with enclosing walls. The chief features of these had necessarily to be windows, floors, staircases, just the things for which there was least authority. In adopting the precedents to these new conditions there was at first considerable ingenuity which gives an interest to the "style"; but other factors, like roofs and chimneys, were suppressed as much as possible as not being quite respectable; although, to a northern mind, the roof is the most essential part of a building—"roof" and "chimney," indeed, are almost synonymous with home. As a whole the building interest, the essential centre of architecture, gave way to scholarship and taste; knowledge of precedents took the place of adventure.

On the other hand it seems as if the men of the Renaissance first awoke to full consciousness of their environment. The ruins of Rome existed, but they had hardly been *seen* for a thousand years. The wonderful Greek temples of Pæstum appear to have been unnoticed even until about 1750. Travellers

passed them by, and shepherds rested in their shadow, but they seem to have been taken for granted and observed only as the goats observed them. The first enthusiasm of the Renaissance must have been a wonderful experience, when men like Donatello, awakening to the idea "We are Romans," explored the Forum, and broke into the chambers of the Great Baths, where they studied the paintings and found noble marble statues buried in the débris.

The great gift of the Renaissance would seem to be the scientific spirit, and we probably owe to it larger ideas of civic order and hygiene. The architects brought back many of the lost powers of their art, and developed certain factors like the staircase and the balustrade. The art of engineering advanced so swiftly that it has since broken away from the general art of building to the detriment of both.

On the one hand the Renaissance was a rhetorical art, but on the other its artists to some degree reconsidered first principles. To go back to first principles in architecture is, we are often told, impossible. Doubtless it is to do so absolutely, but all schools of architecture have done it in some degree, and the Renaissance, in the thought of the greatest mind of its age, was to include an exhaustive exploration of the first principles of all arts.

The history of art is full of instances of return to underlying principles.

Roman architecture, on its structural side, was largely an art of first principles: the early Christian and Byzantine schools of building divested themselves of nearly all that was formula; and Gothic architecture sprang up after the Cistercians had brought about a large return to the structural elements of building. Modern engineering, the noblest architectural result of the Renaissance, is almost entirely an art of first principles.

CHAPTER XV

THE MODERN POSITION

ABOUT the middle of the eighteenth century the first ideal of the Renaissance, the desire to be Roman, passed away. It had been a fashion at courts and they tired of it. About this time the monuments of Greek art were discovered and described, and at home our national architecture was rediscovered. Then soon along the same line of Renaissance—the essential idea of which is the attempt to produce an architecture by copying old external forms—some English architects set about being Greek, and later others became “Gothic men.” After more than a century of these mixed efforts to be Roman, Greek and Gothic, efforts which necessarily fell short of the earlier Renaissance because they lacked its conviction and solidity, a still greater anarchy of style arose. Some clever men varied Greek by a slight tinge of Egyptian, others attempted the Dutch house style, and others the Byzantine church style. Some, again, attempted a Renaissance of Wren’s Renaissance, and to-day others—and this seems to be the last

word—endeavour to bring about a Renaissance of Professor Cockerell's Greek.

It was very natural for the enthusiastic mediævalists who first studied our national monuments to suppose that this architecture was a matter of forms, proportions and details, and that if these were observed and absorbed, similar works might be produced out of due time. When disappointment was felt with the result of these attempts it was always proposed to rectify any failing by still closer study. Not the actual forms, but clever adaptations of them, "in the spirit of the original," was to form the basis of the new departure. Then it was seen that old work was full of variations which seemed to be accidents, and our contract workmen were carefully instructed in jointing, tooling and texture, so that their work might appear to have the same old eager mastery; for still it was thought that if the appearance were reached the essence itself of Gothicness must be present.

About 1860 many gifted men seem really to have thought that they were Gothic architects, and that they could supply thirteenth, fourteenth and fifteenth century buildings at demand. Thus they had little hesitation in applying the process called "Restoration" to our ancient buildings, for, if any part were imperfect, they could make it good and as it

ought to be. They always, indeed, saw that the restorations of other men, and even their own, were failures as soon as they were irrevocable, but they always hoped to be truly Gothic next time. It was not seen that as no man, by taking observation, may be a Chinese or an Egyptian artist, so no man might be Plantagenet or Edwardian at will. Men of high genius like Victor Hugo, Ruskin and Morris, early perceived the facts, but the men who called themselves practical had to shut their eyes to such disquieting literature. Ruskin, for instance, in his chapter on "The Nature of Gothic" wrote: "Its elements are certain mental tendencies of the builders legibly expressed in it; it is not enough that it has the form if it has not also the power and the life. . . . Various mental characters make up the soul of Gothic."

Before passing to consider what might be done—if anything can be done before the hour strikes—it is desirable to examine shortly two æsthetic superstitions about beauty in architecture which stand in the way of our attaining it. One is the vague idea of an abstract and absolute proportion, whereas true proportion is always changing in answer to changing conditions. Proportion, properly, is the resultant of fitness. The Greeks, as their temple architecture slowly developed, came to think that a special

virtue attached itself to dimensional simplicity, that, if every part were related to every other part by a simple scheme of fractions, a unity would result, and that the temple in reaching this unity would become a perfect thing. But all such ideas necessarily break down where building becomes more complex and is conditioned by other needs than that of attaining a sort of sacred perfection. Proportion of this sort was in truth rather a satisfaction to the mind than to the eye. Dante found pleasure in building his poem according to similar rules. Even to-day something of the same feeling persists. We know that if a room is a foot or two out of square, the irregularity can hardly be seen, and if it is a few inches only no one will ever notice it, but, still, we do not like it so. We feel a satisfaction in saying that a room is a double square, or 30×20 , yet it would be just as good a room if it were 31×19 . However, these ideas are definite and clear, and they can be applied to any simple structure like a Greek temple. A modern architect might design a tombstone with certain ratios, if he cared, but he could hardly try to apply a preconceived and arbitrary system to larger problems.

Proportion, then, means either the result of building according to dimensions having definite relations one to another, or it means

functional fitness. It might be said, "But are not some relations more agreeable than others, even if no exact explanation of them can be given?" The answer is twofold—if no explanation can be given the hoped-for result might be obtained by an instinct, but it certainly will not by reasoning about it. And secondly, what is to be done when such ideas of proportions and other considerations conflict—as they always will do until the eye is schooled to take its delight in fitness? For instance, we may think we like the relation of window to wall usual in Italian palaces, but it is unsuitable for darker latitudes. The right proportion of window to wall is that which shall give the most suitable light. There will always be room enough for individual opinion and for instinctive adjustments, but to talk of proportion without attempting to realize what is meant is mere confusion.

The other superstition is that an external form of beauty may be reached and demonstrated other than as the sum of many obviously desirable qualities, such as durability, spaciousness, order, masterly construction, and a score of other factors needful to a fine school of building. There is no beauty beyond these except in the expression of mind and of the temperament of the soul. Probably the less that is *said* about these the better. The temper of the national soul is

likely to operate best in silence. Little could be gained by disquisitions on purpose, fitness, unity, vigour, simplicity, dignity, generosity and intelligibility. Qualities like these rising to joy and fervour, or sweetness and gaiety, all tell in the result for beauty—they are all the stuff from which beauty is made—but the mere semblance of rapture and intensity are abhorrent. Experience seems to show that much æsthetic intention is destructive. No art can long outlast it, for art should deal with higher and deeper things, realities which will force their own expression.

We know those too capricious monuments which popular insight has well named "Follies." All modern buildings have too much that is merely capricious. Little in ancient architecture was "designed." Things designed by a single mind are mostly "sports," which must quickly perish. Only that which is in the line of development can persist. Greek temples and Gothic cathedrals were built traditionally according to custom. Even the sites—those wonderful sites of temples and cathedrals—were not selected because the building would "look well" there. The sites were sacred from remote time or they were pointed out by some oracular dictum. Alike on the Cape of Sunium, the cliffs of Selinus, and the Acropolis rock of Athens, or on the plain of Pæstum and the muddy flat

of Ephesus, the Greeks indifferently founded their great temples. Nothing looks well that has been done for "look." It seems right at first, but quickly the doing becomes diseased. Only by being intensely real can we get back wonder into building once more. We have this awe of a ship, a bridge, a machine. Why should that ancient thing, a house, have become so vulgar and pretentious? It seems to be the result of "good taste."

One rather confusing element is the question of decoration. Here, again, much may be accepted as obvious; casings and inlays of finer material, the glitter of gold, harmonious change of colour, some little intricacy of workmanship, and, above all, stories in painting and sculpture. The commonplaces of ordinary architectural "ornamentation" cannot be justified; at their origin these things had a meaning, and most generally patterns were simplified pictures. "Plastic art has gone through a process of mental evolution far higher than the futile pleasure of decoration." Ample materials for ornamentation exist which are universal and modern without our calling for more hundreds of miles of "egg and tongue" or more acres of "vermiculation." These are such methods as the introduction of precious material, and changes of colour, platings and frets of lines, forms simplified from Nature, sculptured stories

inscriptions; we don't make enough use of inscriptions. After all, we must remember that beauty may be unadorned, and it is possible that ornamentation, which arises in such arts as tattooing, belongs to the infancy of the world, and it may be that it will disappear from our architecture as it has from our machinery. Why should we wish for a sham Jacobean house more than for a motor-car in the style of a sedan chair?

When a better modern architecture is to emerge, we shall necessarily find a greater interest in it and a sounder basis of criticism. In the days when the cathedrals were built, people were as concerned about them as we are about cricket. The arts can only flourish when there is a common interest in them, and constant criticism by all—that is, by all people except critics.

When the series of Renaissance styles reach their end, we may expect that on the then existing basis, whether it may be sham Greek or sham Gothic, a movement will be imperceptibly entered on which will transform the chaos into another order.

The Renaissance was self-conscious, but moderns are conscious that they are self-conscious. In the arts there seem to be only three possible courses open to us: (1) that we may be able to determine our way and come to some agreement, and thus build up

a fully conscious architecture, free and fine; (2) or there may be some turn in civilization, quick or slow, which by a change of conditions will compel a change in the arts; (3) or there remains the treadmill of stylemongering—successive fashions of little party cries and their enthusiasms, now for imitation Gothic, then for the national Renaissance, and a return to Roman and Greek once more.

Supposing that we could as reasonable men make a stand, and guide development, there is much which obviously requires to be done. One of the first things—there are so many—should be a greater public demand for substantial and convenient buildings. In this respect our big cities fall far short of many second-rate towns on the Continent. Except for a hundred or two of buildings, London needs to be rebuilt from end to end. No writer on economics has yet told us what are the limits to expenditure in public arts, whether a beautiful city is an investment, or an extravagance. The modern political economy of quantity should be corrected by a political economy of quality.

Writers who have set out theories of corporate life talk much of utilities, but they often have a very narrow view of what makes a utility; and the blind may lead the blind down so steep a place that they drive those who have eyes along with them. According

to Plutarch, Pericles entered on the rebuilding of Athens as the best means of wisely distributing wealth among the people, and it is somewhat curious that the first systematic writer on political economy was the Greek architect, Hippodamus of Miletus, in the fifth century B.C.

Sir Christopher Wren asserts: "Architecture has its political use; public buildings being the ornament of a country, it establishes a nation; draws people and commerce; makes the people love their native country, which passion is the great original of all great actions in the commonwealth. The emulation of the Greek cities was the true cause of their greatness. The obstinate valour of the Jews, occasioned by the love of their temple, was a cement that held that people together for many ages through infinite changes."

If ever we are to have a time of architecture again, it must be founded on a love for the city, a worship of home and nation. No planting down of a few costly buildings, ruling some straight streets, provision of fountains, or setting up of a number of stone and bronze dolls, is enough without the enthusiasm for corporate life and common ceremonial. Every noble city has been a crystallization of the contentment, pride and order of the community. A period of architecture is the time of a flowing tide.

If the municipalities would spend less on "art," and more on requiring fine quality in all ordinary forms of workmanship the situation would soon be improved. Cleaner streets and tidier railway stations would be better than all the knowledge of all the styles. An endeavour to better the city in inducing civic patriotism would be sure in due time to bring a fit method of expression. When we see how powerful is an idea—the cause, order, form—to boys, it does seem possible that men too may organize themselves into lovers of the city, seekers after discipline.

With increased demand for buildings fit for modern cities must be undertaken the more systematic education of architects. Our education for the most part has been archæological, with the result that we now stand timidly at the centre of a score of roads, and we seem to know all about all of them, but we do not know which to take, although the fairest horizon might be reached if we could go in one direction long enough.

It has been a wasteful system, too regardless of results, or too regardful of wrong results. It is absurd, for instance, that the writer should have been allowed to study cathedrals from Kirkwall to Rome and from Quimper to Constantinople; it would be far better to have an equivalent knowledge of steel and concrete construction.

Now that all the styles on earth have been surveyed and accounted for historically, what is wanted is a new type of classification by essential differences of structure, an account of the powers of architecture, a new science of building morphology. To forget the past would be as foolish as to ignore the future. Behind is custom, as in front is adventure. Great building types should be investigated as structural problems, the temple, basilica, theatre, baths, church, town hall, hospital, bridge, and the city as a whole.

Further, the several factors of building, the powers of architecture, require to be investigated one by one—the wall, the column, the floor, the roof, the buttress, the arch, vault and dome. We want especially for our own country a record of existing building methods and traditions of workmanship, as they are still carried on in their several localities in relation to the materials at hand; as Yorkshire walling and stone dressing—which is still quite beautiful in out-of-the-way parts; Norfolk thatching, Essex plastering, Kentish tiling. Finally, we need a true science of architecture, a sort of architectural biology which shall investigate the unit cell and all the possibilities of combination.

Modern armoured concrete is only a higher power of the Roman system of construction. If we could sweep away our fear that it is

an inartistic material, and boldly build a railway station, a museum, or a cathedral, wide and simple, amply lighted, and call in our painters to finish the walls, we might be interested in building again almost at once. This building interest must be aroused. We have to aim at a standard of ordinary good quality; damp, cracked and leaky "architecture" must give way to houses as efficient as a bicycle.

Our great difficulty is lack of spontaneous agreement; an expressive form of art is only reached by building out in one direction during a long time. No art that is only one man deep is worth much; it should be a thousand men deep. We cannot forget our historical knowledge, nor would we if we might. The important question is, Can it be organized and directed, or must we continue to be betrayed by it? The only agreement that seems possible is agreement on a scientific basis, on an endeavour after perfect structural efficiency. If we could agree on this we need not trouble about beauty, for that would take care of itself. Our survey should have shown us that there is not one absolute external form of beauty, but rather an endless series of changing modes in which the universal spirit of beauty may manifest itself; that, indeed, change of the form is one of the conditions of its continuance. In Egyptian

architecture power, wonder, terror, are expressed; in the Greek, serenity, measure and balance, fairness; in the Roman, force and splendour; in the Byzantine, solemnity, mystery, adoration; in the Romanesque, strife and life; in the Arab, elasticity, intricacy and glitter, a suggestion of fountain spray and singing birds; in the Gothic, intensity, swiftness, a piercing quality, an architecture not only of stone, but of stained glass, bells and organ music. Beauty is the complexion of health, to reach it we must put aside our preoccupation about different sorts of rouge. We are always agonizing about design, but design, as Rodin has said, is as nothing compared to workmanship. Any one may see a beautiful landscape composition, but it needs a Turner to paint it. A rearing horse is a living statue, but the difficulty is to carve like Phidias. A skilful architect may design the lines of a cathedral bigger than Bourges, and embodying several excellent new ideas, before his breakfast, but there is little virtue in writing "700 feet long," or in planning three transepts instead of one, or in making the chapels quatrefoils instead of octagonal; these are nothing compared to great building skill.

Through the ages when architecture was a direct and developing art, architects were masters of building, engineers, masons and

carpenters, in immediate contact with materials. Experiment must be brought back once more as the centre of architecture, and architects must be trained as engineers are trained. It cannot be genius that is lacking to us. An age that can produce Watts' Physical Energy, Madox Brown's Manchester paintings, and the Forth Bridge, should be able to produce anything—anything that is, except the Tower Bridge as well.

Modern works like the Nile dam, the magnificent railway viaduct at Morlaix, and the Rhine bridge at Cologne, need no apology. We must learn from France, Germany and Switzerland how worthily to finish engineering structures; most of our English works are too crude and raw.

The modern way of building must be flexible and vigorous, even smart and hard. We must give up designing the broken-down picturesque which is part of the ideal of make-believe. The enemy is not science, but vulgarity, a pretence to beauty at second hand. We have to awaken the civic ideal and to aim first at the obvious commonplaces of cleanliness, order and neatness. Much has to be done, it is a time of beginning as well as of making an end.

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